Paper

OCT. 5, 1951

HOW TO GUARD AGAINST CORROSION . . . Page 24

REPORT ON INTERNATIONAL RESEARCH IN CHEMISTRY OF CELLULOSE AND LIGNIN . . . Page 50

WOOD PULP

G

*Established 1886*

"With sufficient force, any weight may be moved."

ARCHIMEDES

Apply enough thought . . . exert enough effort . . . almost anything within reason can be achieved. Prodigious strides have been taken toward solving the varied and complex problems confronting the Pulp and Paper Industry throughout the years.

The continuing vision, courage and determination characteristic of the Industry assure further substantial progress.

**GOTTESMAN & COMPANY**

— INCORPORATED —

100 PARK AVENUE • NEW YORK 17, N. Y.

EUROPEAN OFFICES: Birger Jarlsgatan 8, Stockholm, Sweden

# 10 TONS OF PULP PER BLOW

Profitable production of high grade kraft, wrapping and bag, is evident at the Southern Division mill of the Hudson Pulp and Paper Corporation near Palatka, Florida. Operations began in 1947 and proved so successful that within three years new additions, designed to double the former output, were added.

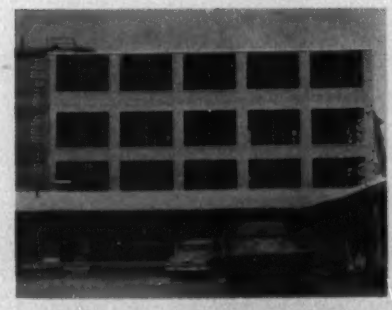
Horton welded steel digesters have been serving the mill since it began operation. Originally four Horton digesters each having a capacity of 3320 cubic feet or 10 tons of pulp per blow were installed—and five more have been put into service with the recent expansion. Together these nine Horton digesters help keep production at a high level for the Hudson Pulp and Paper Corporation.

For more information about Horton digesters or other steel structures—and their application in the pulp and paper industry—write our nearest office. There is no obligation on your part.

*Left: Looking up at one of the Horton digesters installed at the Southern Division Mill of the Hudson Pulp and Paper Corporation. Below: Extension to digester building housing five Horton digesters at Hudson plant near Palatka, Florida.*

**Horton Equipment for the Pulp and Paper Industry**

**chip tanks . . . blow tanks . . . pulp tanks**
**elevated water tanks . . . Marx Savealls**
**sulphate and sulphite digesters . . .**
**accumulators . . . acid tanks . . .**



## CHICAGO BRIDGE & IRON COMPANY

| | | |
|---|---|---|
| Atlanta, 3.....2142 Healey Building | Detroit, 26.....1565 Lafayette Building | Salt Lake City, 4.....567 West 17th South Street |
| Birmingham, 1.....1809 North 50th Street | Houston, 2.....2163 National Standard Building | San Francisco, 4.....1577-200 Bush Street |
| Boston, 10.....1664-201 Devonshire Street | Los Angeles, 17..1561 General Petroleum Building | Seattle, 1.....1368 Henry Building |
| Chicago, 4.....2130 McCormick Building | New York 6.....3333-165 Broadway Building | Tulsa, 3.....1666 Hunt Building |
| Cleveland, 15.....2256 Guildhall Building | Philadelphia, 3..1665-1700 Walnut Street Building | Washington 6, D. C.....1170 Cafritz Building |

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE

In Canada: HORTON STEEL WORKS, Limited, FORT ERIE, ONT.

# Less water returned to wire with B. F. Goodrich Dukbak table rolls

● You can get more even formation and fewer spotted sheets on your Fourdrinier if it is equipped with B. F. Goodrich Dukbak table rolls. Ordinary rolls carry a great deal of water on around; throw it up against the wire again. B. F. Goodrich research has overcome this problem with rolls made of rubber that doesn't like water —throws it down and away the instant the water touches the surface. That is why this roll is called Dukbak; water can't stick to it long enough to get back into the sheet.

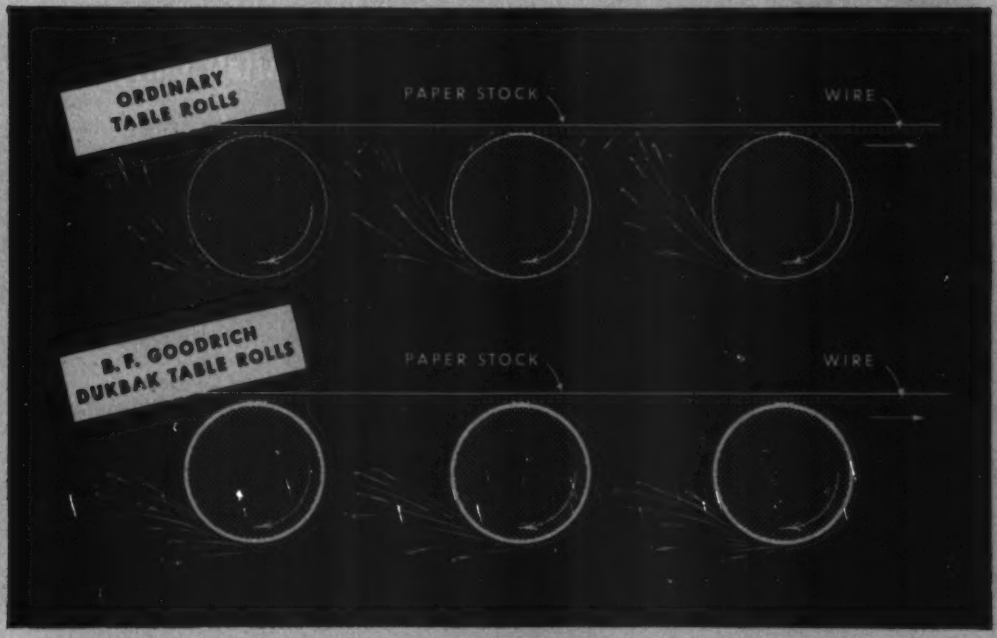
B. F. Goodrich Dukbak rolls are made of a special long-life rubber—ground straight and true so as to move evenly with the wire without developing high or low spots. With wire always level, the sheet produced is more uniform.

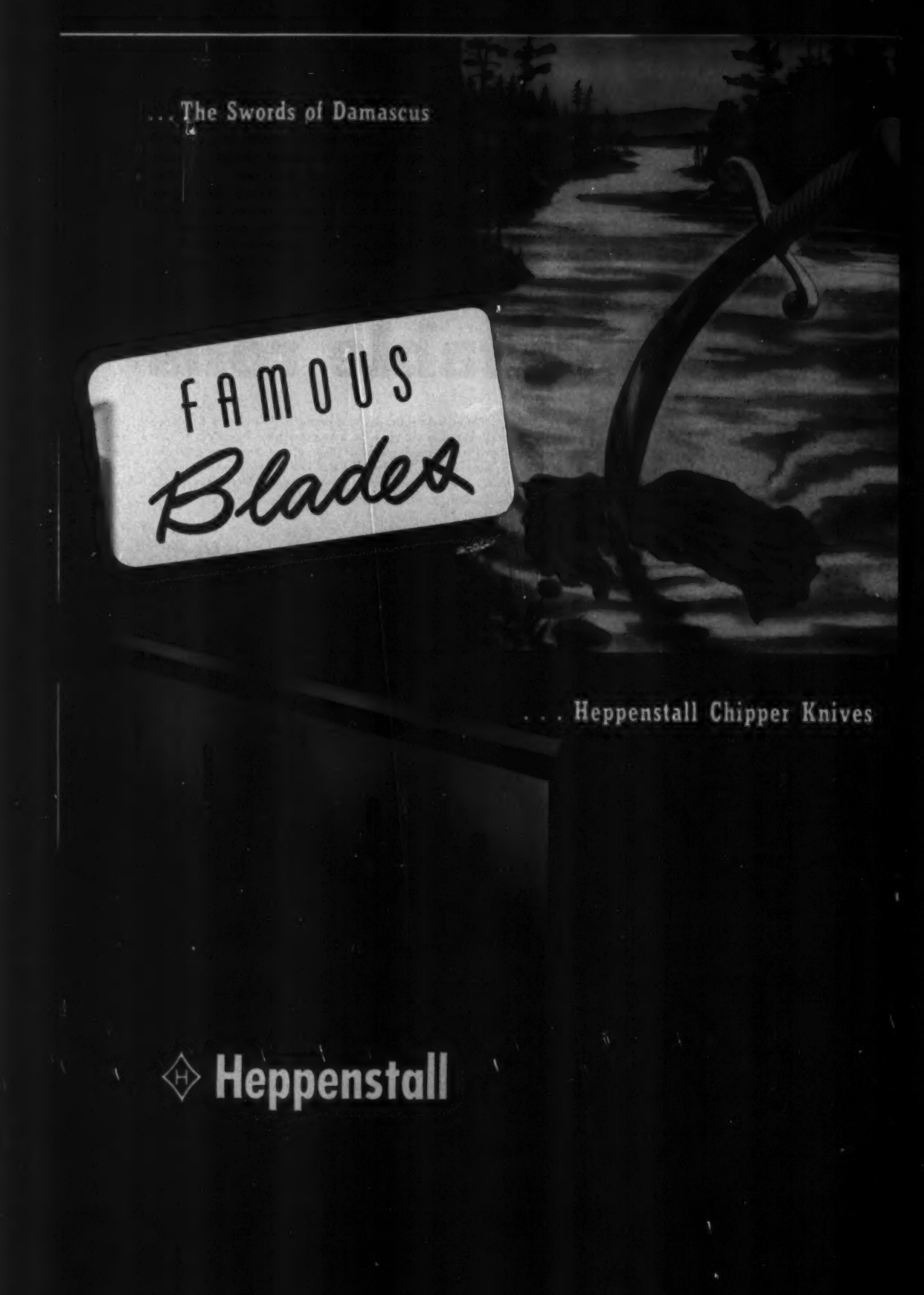
A Dukbak roll bent by dropping can be straightened readily, because the cover, attached by the Vulcalock process, is an inseparable part of the roll. Corrosion is prevented by sealing ends with rubber.

When you order a Fourdrinier, specify B. F. Goodrich Dukbak rolls to your machine builder. Or, if you are buying or re-covering rolls, write *The B. F. Goodrich Co., Industrial & General Products Division, Akron, Ohio.*

*Dukbak Table Rolls* BY

**B.F.Goodrich**




. . . The Swords of Damascus
FAMOUS
Blades
. . . Heppenstall Chipper Knives
Heppenstall

# Paper TRADE JOURNAL

VOL. 133 OCTOBER 5, 1951 No. 14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## NEXT WEEK

**An excellent and comprehensive survey covering the use of corrosion resistant metals in the Paper Industry** will be found in "Corrosion-Resistant Metals in the Pulp and Paper Industry" by Daniel L. Horigan. This article, the first part of which is contained in this issue, will be concluded next week: It is the first of a new series of University of Maine Lectures.

## REMEMBER THESE DATES

*OCT. 10-12:* American Pulp & Paper Mill Superintendents Assn., Southern and Southeastern Div's., George Washington Hotel, Jacksonville, Fla.

*OCT. 15-17:* The Packaging Machinery Mfrs. Institute, Nineteenth Annual Meeting, Mid Pines Club, Southern Pines, N. C.

*OCT. 15-18:* 6th Engineering Conference, Technical Assn. of Pulp and Paper Industry, General Oglethorpe Hotel, Wilmington Island, Savannah, Ga.

*OCT. 25-26:* Technical Assn. of Pulp and Paper Industry, Plastics Conference, State University of New York, College of Forestry, Syracuse, N. Y.

*OCT. 29-31:* National Foreign Trade Convention, Waldorf Astoria, New York City.

*NOV. 26 to DEC. 1:* 23rd Exposition of Chemical Industries, Grand Central Palace, New York, N. Y.

*DEC. 2-5:* American Institute of Chemical Engineers, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

*FEB. 18-19:* Salesmen's Assn. of the Paper Industry, Annual Meeting and Luncheon, Waldorf-Astoria, New York, N. Y.

*FEB. 19-21:* Technical Assn. of Pulp and Paper Industry, Annual Meeting, Commodore Hotel, New York, N. Y.


**SUBSCRIPTIONS**

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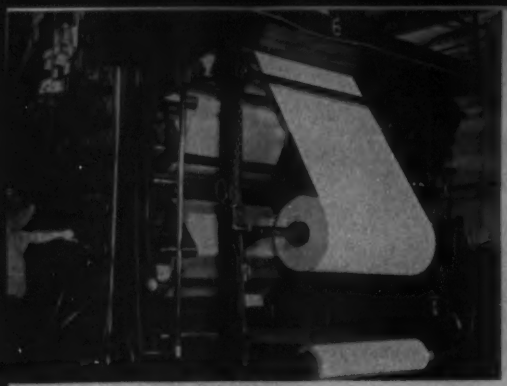
# SUN LUBRICANTS UP PRODUCTION, LOWER COSTS IN 4 PAPER MILLS

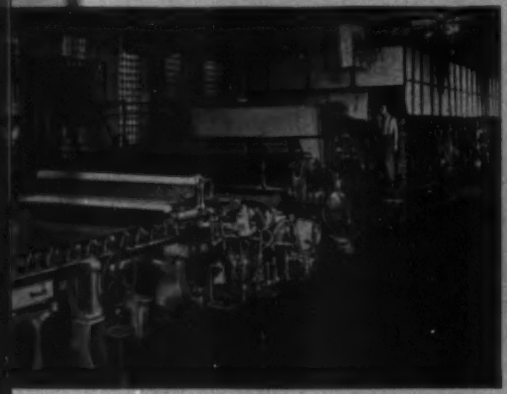


**DECREASED BEARING AND OIL COST.** A Sun lubricant saved this mill $2,900 in two years. Supercalender bearing failures used to average five a month, because the former oil could not stand the temperature and operating loads.

Changing to Sun lubricants increased production efficiency and effected substantial savings in all the mills in which the accompanying pictures were taken. Such results are typical in the growing number of mills using Sun "Job Proved" lubricants and the technical service that goes with them.

In the picture captions, the problems and their solutions have had to be greatly condensed. If you or your production and maintenance personnel would like all the facts, and if you are located in eastern U.S. or Canada, we'd be glad to have a Sun technical representative call. Just write Department PT-7.

**BEARING SCORING REDUCED.** This mill, one of the biggest, switched to a Sunvis Oil to minimize scoring of drier roll bearings. The same Sunvis Oil was recently specified for a brand-new machine—one of the fastest producers in the world.



**10 YEARS WITHOUT A BEARING FAILURE.** That is the achievement record of the Sun oil which lubricates this Fourdrinier—one of six which operate constantly to turn out 180,000 feet of fine offset and specialty paper every hour.

**50% LESS GREASE NEEDED.** This and other advantages were gained by switching to a Sun bearing grease for the Fourdrinier. The costly grease formerly in use would not stay in the wet-end bearings under grueling continuous duty.

**SUN INDUSTRIAL PRODUCTS**

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SUNOCO

Paper TRADE JOURNAL

# TRENDS

Office of the PAPER TRADE JOURNAL, Wednesday, October 3, 1951.

In the record of American business, the second half of 1951 may come to be known as the Korean boom corrective era when consumer demand adjusted from heavy forward buying and stockpiling in the first year of Defense Mobilization.

Some businessmen speak of it now as the returning buyer's market; others as a return to more normal business; some as a temporary adjustment of stocks with a pickup right ahead. A few see in it the early makings of a recessive business period.

Whatever you call it is determined ultimately by how poor business is for you; how much your product is affected by Defense planning and buying.

### Divergence of Trends

If for instance you produce paper, boards, products, etc., for packaging foods, drugs, soaps, and other commodities, your experience may be that of others who find it has fallen off since late August. Business is still good by pre-Korean yardsticks; but you feel that consumers are liquidating inventories to some degree. They know your prices are fairly stable and are either under CPR 22 or will soon be controlled by a tailored ceiling order; that supplies will probably flow to meet their demand under M-72 and other distribution controls of NPA — barring an all-out war. Thus buying has lost its drive and has temporarily suffered a dip.

This portion of general business either has noted a slight pickup during the past few weeks or expects one to develop when consumer inventories are adjusted to reset dimensions.

Into this classification falls industrial packaging materials such as glassines, cellophanes, foils, and other protective packagings; folding cartons and containers, and printed wrapping stocks.

### Soft Goods Outlook Poor

If on the other hand your product is used in soft goods wrappings, the outlook is poor. Demand is at low ebb, has not felt the usual Fall pickup. Many economists believe the buying dollar is either being diverted to installment payments on television sets, automobiles, refrigerators, housing, etc.; is being reserved to pay taxes; is going into savings to replace those spent in last year's scare-buying; is buying Defense Bonds, etc. Agreed is that there is a lack of consumer buying power after buying foods and other necessities at today's inflated prices for any outlay in soft goods beyond the barest needs.

Some who would eschew the term "over-production" to describe the weak condition of this segment of general business are willing to accept the twisted phrase: "under consumption of soft goods."

### Waste Papers Continue Tumble

A study of the tumbling waste paper prices tells of weakness in the industry's bell-wether: paperboard.

To press time, October prices were not all known. It can be said, however, that, on such a weak market, whatever prices are set today will scarcely hold for a month; any price is "nominal." (Which means that on such a market you can dicker about the price you are willing to pay, if you are in the buying mood.) In other words, none will argue that this is a buyer's market.

In the Chicago area, old corrugated on October 1 took a dip of $8, *mixed* and *news* were dropped $3, and high grades of krafts and hard whites also were hit sharply. Prices for New York, Boston and Philadelphia were not known at press time because of the intervening holidays.

### Paperboard Demand VS Prices

The trend in paperboards is toward firm prices for folding cartons for food and commodity packagings. A major producer is now quoting a firm price on all orders for shipment within 30 days. Other orders are accepted at price prevailing on date of shipment. Some price variations are reported.

Within the trade, one hears talk that lower prices for boards must come before box-makers buy again; that they choose to use of their large stocks of highpriced boards. Held by many is the belief that high board prices were based on premium waste paper prices, that board prices are now due for a drop. Others argue that freight rate increases have already wiped out the savings in raw material costs. Some speak of the early release of a tailored ceiling order for boards. Price resistance is likely in that part of the industry which packs soft goods.

### No Weakness in Kraft Wrapping

Easing of demand in kraft wrapping papers, as well as in tissues, is likely to be slow in registering itself because of consumer stock conditions. Wholesalers and consumers alike have an unsatisfied need for kraft; some consumers have fair stocks of the better grades of tissues.

Production of kraft wrapping paper is at an unaltered pace, which in June stood at 31,659 tons compared against 44,614 tons in June, 1950. No cancellations or deferments of allotments are reported. Contract price for standard grade is $7.75/8.00 per hundred pounds for 40-lb. basis weight. Spot tonnages, which largely consist of unbleached northerns from an extra run at mills not under contract for wrapping papers, are priced around 15/15½ cents a pound, f.o.b. mills.

Production of bag and shipping sack paper is up from 1950's level of 26,000 to 27,000 tons a week to 29,000 or 30,000 tons. Conversion operations are spotty; some light easing of demand is reported.

Gummed tapes are in ample supply with price-cutting noted among converters who are said to be selling below cost to meet the price of integrated producers.

### Tailored Price Regulation Awaited

Distributors who gripe about industry practices which have shut them out of normal supplies of wrapping papers are looking forward to issuance of the kraft pricing order that is believed to be imminent.

Recommendations of the industry's advisory committee to OPS were that dollars and cents ceilings should be set on the six grades of kraft papers in which 60 percent of production lies. Other grades would be determined by differentials from key grades which would be applied to special size rolls and sheets, and variations in weight, colors, packaging and small lots.

Wholesalers anticipate that with the imposition of such an order they could look for a regular flow of kraft wrapping paper. Mill spokesmen believe that with the naming of favorable differentials between grades and weights of wrapping papers, production would become more inviting to kraft producing mills, and that business could look for larger supplies of the much-wanted and needed wrapping paper.

### Tightness in Wrapping Tissues

Wrapping tissues of the No. 1 and 1½ grades are still in tight supply. Production has been restricted since Korea because of sulfite pulp shortages.

Distributor inventories are to the floor, and allotments are being accepted. Pressure of buying is a little easier, however. The market is strong, prices firm following August rises.

The No. 2 market is softer. Traditionally the grade hit first by market strength or weakness, it now is in ample supply by reason of the return of marginal mills to production. (These are the mills which divert to toilet tissue when the market is ripe. Currently it is in abundant supply.) Demand for No. 2 has been softened by weakness in soft goods, and pricewise it now is weak and in line with better grades. —E. P. N.

**Paperboard Production (Tons)***

| | Sept. 22 1951 | Sept. 15 1951 | Sept. 23 1950 |
|---|---|---|---|
| Production | 214,310 | 222,702 | 229,731 |
| New Orders | 155,900 | 201,011 | 219,191 |
| Unfilled Orders | 475,903 | 538,949 | 700,166 |
| % of Activity | 90 | 94 | 101 |

* Source: NPA.

# DILTS DOUBLE EMBOSSER

## a production approach to embossing

Designed primarily to eliminate the costly "run-in" and pattern change time now experienced in embossing operations.

Pattern changes from one die roll to another are made by merely turning a pressure selector valve. New patterns on fiber rolls can be run in simultaneously with embossing production.

Matched steel, steel to fiber, or steel to rubber rolls can be used according to need.

There are many more features to the new Dilts Double Embosser.

Dilts

Write for Bulletin DOM 7.

SHARTLE BROS. MACHINE CO., Middletown, Ohio • Divisions of THE BLACK-CLAWSON CO., Hamilton, Ohio
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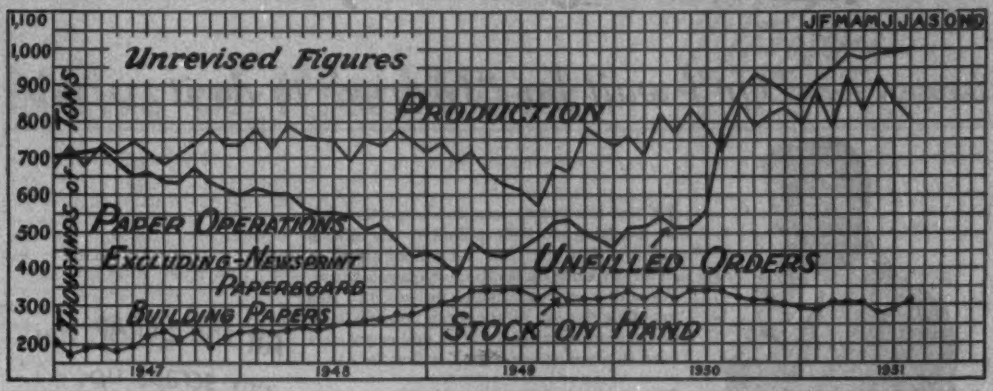
Associates: THE ALEXANDER FLECK LTD., Ottawa, Ont. • Subsidiary: B-C INTERNATIONAL LTD., Greener House, Haymarket, London, S. W. 1, Eng.

# Our Business




## Brief of Important Figures

| Source | Production | Week Ending Sept. 22, '51 | Aug. 25, '51 | Sept. 23, '50 |
|---|---|---|---|---|
| APPA | Paper Production Percent Capacity[2] | 99.0 | 100.8 | 100.3 |
| | Unbl. Kraft Paper Production Percent | 97.9 | 93.4 | 94.4 |
| NPA | Paperboard Operating Ratio Percent Inch Hours | 90 | 94 | 101 |
| | | July 1951 | June 1951x | July 1950 |
| APPA | Paper Production[6] (Except Newsprint and Building Papers) ...Tons | 808,000 | 891,487 | 748,000 |
| | New Orders ...Tons | 848,000 | 889,173 | 957,000 |
| | Unfilled Orders ...Tons | 1,035,765 | 984,685 | 775,090 |
| | Shipments ...Tons | 796,000 | 893,075 | 745,000 |
| | | [4]Aug. 1951 | July 1951 | Aug. 1950 |
| NPA | Paperboard Production ...Tons | 1,112,731 | 815,547 | 1,130,242 |
| | New Orders ...Tons | 1,081,321 | 814,729 | 1,365,968 |
| | Unfilled Orders ...Tons | 470,841 | 537,591 | 729,058 |
| | **Our Customers Activities Index[1]** | **Latest Mo.[5]** | **Previous Mo.[5]** | **Year Ago[5]** |
| FRS | Manufactures Total Index | 223 | 233 | 207 |
| | Durable Mfg. Index | 264 | 276 | 237 |
| | Nondurable Mfg. Index | 191 | 197 | 182 |
| | Chemical Products Index | 302 | 300 | 259 |
| | Mfg. Food Products Index | 177 | 165 | 178 |
| | Printing and Publishing Index | 159 | 172 | 150 |
| ODC | Magazine Advg.-Printer's Ink Index | 368 | 350 | 316 |
| | Retail Sales Combined Adjusted Index | 347.4 | 342.6 | 354.7 |
| | Drug Index | 236.6 | 234.9 | 221.2 |
| | General Merchandise Group Index | 329.6 | 322.2 | 369.7 |
| | Grocery and Combination Index | 446.2 | 439.4 | 410.9 |
| | **Prices Index** | | | |
| BLS | Consumers Price Index[3] | 185.5 | 185.2 | 172.0 |
| | Wholesale all Commodities[3] | 179.5 | 181.8 | 162.9 |
| | Wholesale Foods[3] | 186.0 | 186.3 | 171.4 |
| | Commodities other than Farm Products and Foods[3] | 168.7 | 170.6 | 151.6 |
| | Wholesale Pulp and Paper[3] | 197.2 | 196.2 | 159.8 |
| | Purchasing Power of Dollar, Consumers Prices[1] | 53.9 | 54.0 | 58.1 |
| | **General Activity Index** | | | |
| FRS | Mfg. Production-Worker Payroll | 429.4 | 435.7 | 367.5 |
| | Unemployment Compensation Initial Claims (M) | 1,086 | 1,118 | 971 |
| | Miscellaneous Carloadings-Thousands of Cars | 1,454 | 1,937 | 1,433 |
| | Electric Output (Million KW hr.) | 35,435 | 34,966 | 31,626 |
| PTJ | Average 32 P & P Common Stocks as of Sept. 29 | $40.03 | $39.23 | $33.50 |

[1] 1935-39=100 Unadjusted Index
[2] 1926=100
[3] New 6-7 day basis.
[4] For Five Weeks.
[5] For details see APPA Monthly Statistical Summary—July 1951 Estimated Figures
[6] Latest Month Available on Request
x Revised figures

# Are you turning in all your SCRAP?

## *Don't wait for "George" to do it*

IF you are a steel user, this important job of getting more scrap back to the mills is directly up to *you*. You just cannot afford to sit idly by while the scrap shortage gets worse. For unless everyone really pitches into this job of digging out all the scrap possible, steel production is bound to suffer, and every steel user, in more or less degree, will suffer too.

*More* scrap means *more* steel—it's as simple as that.

Right now some mills have only a bare two-days' supply of scrap on hand. Others have even less. Some steel-making furnaces already have had to shut down for lack of scrap. The situation is serious. Only you can help improve it.

By turning in every piece of worn-out equipment, every obsolete tool and machine, in fact every pound of iron and steel scrap you can comb out of your plant, you'll be helping relieve the worst scrap shortage since Pearl Harbor days . . . and the steel industry will be able to produce more of the steel you need.

Remember—it takes at least one-half ton of scrap to make one ton of steel. To maintain steel's present high production schedules requires more than 1400 carloads of industrial scrap *every* day. So turn in your scrap—ALL your scrap—and keep the mills rolling. This is more than a shortage. It's an emergency that vitally concerns you—and us—and the Nation.

***You'll find your local scrap dealers listed in the yellow pages of the phone directory.***

USS

This page would ordinarily be used to tell you about

**NATIONAL SEAMLESS PIPE AND TUBES**

but, because without SCRAP we cannot produce steel, we are asking instead for your all-out help in getting more SCRAP to the mills.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.
(Tubing Specialties Division)
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

1-1348-A

UNITED STATES STEEL

# News of the Week

Paper TRADE JOURNAL

## SCOTT IMPROVEMENTS

The Scott Paper Co., of Chester, Pa., will rebuild five of the older paper machines at its Chester plant to increase both the quality and volume of paper production.

It is anticipated that production increases will range from 8 to 20 percent per machine. Capital outlay will vary from approximately $20,000 to $256,000 for each machine.

The company's chemical research facilities were augmented recently by installation of a baby paper machine in its newly-enlarged laboratory at Chester. The working model is about six feet high by ten feet long, with a rated capacity of 20 feet a minute. It simulates normal operating conditions of actual paper manufacture and permits researchers to check laboratory experiments by practical application.

Brunswick Pulp & Paper Co., jointly owned by Scott and Mead Corp., has completed expansion and improvement program to boost production by one-third.

One of the west coast pulp mills of Coos Bay Pulp Corp., a wholly-owned Scott subsidiary, is making arrangements to supplement its wood supply by purchasing wood chips from saw mills.

## MAY RESTART QUEBEC MILL

The frequently discussed proposals for reopening of long-idle wood pulp plant at Chicoutimi, Que., may be close to realization.

Premier Duplessis said a plan to put the mills back into operation, after some twenty years' idleness, was laid before him by William Biel, New York lawyer, representing United States financial interests.

The sponsors of the plan appear disposed to carry out the work and incur the expenses that are necessary.

Their plan would be for operation of the plant with a production schedule for between 250 and 400 tons of pulp daily.

Last private owner of the Chicoutimi mills was the Quebec Pulp Co.

## OKAY SCOTT-SOUNDVIEW MERGER

Scott Paper Co., Chester Pa., and Soundview Pulp Co., Everett, Wash., announced jointly that their respective boards of directors have approved a joint plan and agreement of merger pursuant to which Soundview is to be merged into Scott if the plan of merger is approved by the shareholders of each company at meetings to be held on November 5, 1951.

The basis of the proposed merger will be the issuance of one and one-quarter common shares of Scott for each share of common stock of Soundview. Under the proposed plan the present Scott preferred shares and common shares will not be called in but will remain outstanding.

The agreement of merger provides that if the merger is completed according to schedule, Scott as the surviving corporation will pay a dividend on its common shares in December at the rate of 60 cents per share, so that each Soundview shareholder will be entitled to receive the equivalent of 75 cents per share of Soundview common stock.

The establishment by Scott of a paper mill adjacent to the bleached sulphite pulp plant of Soundview on Puget Sound in the State of Washington would afford the economic advantages of ready access to a large and rapidly growing market for Scott's finished products and substantial savings in operating costs through the piping of pulp in slush form directly to the paper machines.

Soundview's plant has a rated capacity of 600 tons per day. The pulp produced is well suited to the manufacture of Scott's products.

## BERWIN TO MAKE NEWSPRINT

Plans for an addition to the Berwin Paper Manufacturing Corp., Dansville, N. Y., were announced by Gannett Co., Inc. The capital stock of the Berwin Corp. was acquired by the Gannett Co. in a deal which was consummated recently.

Construction of the extension on the present building will permit the conversion of part of the plant's facilities to the manufacture of newsprint.

However, the plant will continue the manufacture of tissue paper products even after newsprint production starts, according to Herbert W. Cruickshank, secretary-treasurer of the Gannett Co., who announced the plans.

Mr. Cruickshank stressed that only one of the plant's two paper-making

Fellowships totalling $1500 cash were this year awarded by the Pulp and Paper Industry in British Columbia to three U.B.C. graduates of the Faculty of Forestry. The recipients were David Wilson of Victoria, John Harry Gilbert Smith of Kamloops and, above, Jack Burch (at left) of Cranbrook, who is receiving his $500 fellowship from Paul E. Cooper, Chairman, Western Division, Canadian Pulp and Paper Assn. . . . Mr. Burch left recently for Syracuse University where he will pursue Forest Entomology studies at the New York State College of Forestry . . . Mr. Smith is attending Yale to obtain his doctorate in Forestry and Mr. Wilson is attending the University of California pursuing research in forest economics for his Ph.D. Degree. He is twice a winner of a Canadian Pulp and Paper Assn. $500 fellowship.

machines will be converted to newsprint manufacture, and newsprint production is several months away because of the necessity of building the addition. Architects now are drawing plans.

Arthur J. Thompson, present superintendent of the paper mill, will continue in charge. He has directed operation of the firm since last April. Previously he had completed a newsprint mill in which eleven publishers have interests at Gary, Ind.

Newly elected officers of the Berwin Corp. are: Frank Gannett, president; Frank Tripp, vice-president; H. W. Cruickshank, secretary-treasurer, and A. J. Thompson, assistant secretary.

## NORTHWESTERN PULP & PAPER PLANS TOWNSITE

OTTAWA—New Pacific Coal & Oils, Ltd., parent company of North Western Pulp & Power Co., projector of a pulp and paper mill east of Edmonton, Alberta, is setting up a new townsite in Bryan, Alberta, including plans for 64 homes for workers, a community center and school. A company power plant, 500 kw capacity, will be completed any day now on the site, as well as a railway station to be established by the Canadian National Railways.

## NEW C-Z CONVERTING PLANT

Crown Zellerbach Corp. has awarded Swinerton & Walbert Co. a contract for construction of a $3 million paper converting plant at San Leandro, Calif.

When completed in August, 1952, the 300,000-square-foot unit will produce annually 25,000 tons of towels, napkins and grocery bags.

## FILTER PLANT FOR STEVENS

SOUTH HADLEY, MASS.—The Stevens Paper Co. of Windsor, Conn., which maintains divisions in South Hadley Falls and Westfield, has been granted a permit for a new filter plant on Canal St. The building will be 45x45x 30 feet and will be of reinforced concrete. Estimated cost is $9,000.

## COMPLETING SETTLING BASIN

OREGON CITY, Ore. — Near-completion of a 19-acre settling basin for effluent from the West Linn plant of the Crown-Willamette division of Crown Zellerbach Corp. is announced by Malcolm J. Otis, resident manager.

The basin will have a capacity of 88 million gallons of spent liquor from the paper mill, which produces an average of 200 tons of sulphite paper daily. According to engineers' figures the storage basin will handle the entire liquor and "strong wash water" output of the plant for a period of 220 days.

Objective of impoundment of the mill's waste liquor is to prevent pollution of the waters of the Willamette river during low-water stages. Tests by the Oregon Sanitary Authority and by Oregon State College researchers indicate that no pollution occurs from paper mill waste when the river is running at flood.

## U. S. IMPORTS WOODPULP

**Preliminary, August, 1951**

| Item | Country of Origin | Short Tons |
|---|---|---|
| **Mechanical** | | |
| Unbichd. | Canada | 20,914 |
| | Sweden | 556 |
| | Finland | 1,805 |
| | | 23,275 |
| Screenings | Canada | 186 |
| Bichd. | Canada | 1,440 |
| **Chemical** | | |
| Sulfite, Unbichd. | Canada | 40,245 |
| | Sweden | 1,164 |
| | Finland | 6,452 |
| | | 47,861 |
| Screenings | Canada | 434 |
| Sulfite, Bichd. Rayon & Special Chem. Grades | Canada | 19,569 |
| Other | Canada | 24,100 |
| | Sweden | 1,321 |
| | Norway | 617 |
| | Finland | 858 |
| | | 26,896 |
| Sulfate, Unbichd. | Canada | 13,538 |
| | Sweden | 3,531 |
| | Finland | 4,595 |
| | | 21,664 |
| Sulfate, Bichd. | Canada | 43,175 |
| | Sweden | 1,927 |
| | | 45,102 |
| Soda Pulp, Bichd. & Unbichd. | Canada | 2,988 |
| **Totals, August** | Canada | 166,589 |
| | Sweden | 8,499 |
| | Finland | 13,710 |
| | Norway | 617 |
| | | 189,415 |

## ANOTHER PAPER CONTAINER PLANT FOR CONTINENTAL

Continental Can Co.'s Paper Container Division has taken over the company's Metal Division plant in Memphis, Tenn., and shortly will begin manufacturing paper cups and containers at this location.

Production from this, the fourth paper container plant in the Division, will greatly improve the company's ability to meet increasing demand of dairy and ice cream manufacturers for Continental products, particularly for customers in the Southern and Central states.

## FIRE AT ROCHESTER PLANT

Fed by tons of paper and cardboard, flames roared through the Rochester Paper Products Co., Inc., 25 Spencer Street, Rochester, N. Y., September 26, causing extensive damage.

The roof of the building collapsed, one section of wooden wall was destroyed and flames worked down into a basement and sub-basement of the building. The firm manufactures cardboard tubes for mailing and lining for paper boxes.

The president of the 32-year-old firm, Robert M. Van Order, estimated the damage at between $75,000 and $100,000.

## FIGHTING PAPER WANTED

Invitation to bid has been issued by the New York Quartermaster Procurement Agency, 111 East 16th Street, New York 3, N. Y., on QM-30-280-52-288, covering Liner, various, 170,000 each; and Filler, various, 185,000 each. Bids will be opened October 10, 1951, at 3:00 p.m. (EST) at the New York office. This procurement is for the U. S. Army.

QM-30-280-52-259, covering Paper, Toilet, 1000 sheets per roll, 8,000,160 rolls. Bids will be opened October 26, 1951, at 1:00 p.m. (EST) at the New York office. This procurement is for the U. S. Army.

QM-30-280-52-241, covering Envelope, packing list, waterproof, waxed end opening, printed with metal clasp and four metal eyelets, 4½" x 5¾" outside dimensions, 240,000 each; and Protector, packing list, black asphalt impregnated, laminated fiberboard, 5¾" x 7", 108,000 each. Bids will be opened October 15, 1951, at 4:00 p.m. (EST) at the New York office. This procurement is for the U. S. Army.

QM-30-280-52-242, covering Bag, paper, coffee, glassine lined, with metal tie, capacity 1 lb., 3,940,000 each; and Bag, paper, kraft, sack, satchel bottom, ¼ bbl., 15,949,000 each. Bids will be opened October 16, 1951, at 10:00 a.m. (EST) at the New York office. This procurement is for the U. S. Army.

QM-30-280-52-243, covering Bag, paper, flour, laminated export pack, 5 ply, 100 lb. capacity, 27,800 each. Bids will be opened October 16, 1951, at 2:00 p.m. (EST) at the New York office. This procurement is for the U. S. Army.

QM-30-280-52-280, covering Paper, typewriter, bond, chemical wood, sub 16, various colors and sizes, 870,581 ream. Bids will be opened October 10, 1951, at 10:00 a.m. (EST) at the New York office. This procurement is for the U. S. Army.

QM-30-280-52-264, covering Rolls, paper, butcher, wrapping, kraft, waxed, water and blood proof, in 1,000 foot rolls, 15" width, 200 rolls; and Bags, paper, grocers, type III, satchel bottom, 100,000 bags; and Paper, wrapping, kraft, roll form, various, 3,700 rolls; and Paper, wrapping, kraft, sheet form, 30" x 40", 150,000 quires. Bids will be opened October 18, 1951, at 2 p.m. (EST) at the New York office. This procurement is for the U. S. Navy.

# BIRD SCREENS

## *Belong in Your Paper Production Picture*

Bird Screens are universally identified with continuous production of uniformly good paper at maximum paper machine speed.

Ninety million pounds of paper pass through Bird Screens every day.

Now, more than ever, you need up-to-date Bird Screens of ample capacity to meet the demands on your paper machine.

Notice the Dirtec tailings unit on this Bird Screen. It handles up to seven tons of screen tailings per day, removes the dirt completely with negligible fibre loss. Simple, inexpensive, compact, Dirtec Tailings Units are by all odds the best way to handle screen tailings. Have you tried them on *your* Screens?

**BIRD MACHINE COMPANY**

SOUTH WALPOLE • MASSACHUSETTS

## U. S. ENVELOPE BOOSTS PAY

SPRINGFIED, Mass.—The United States Envelope Co. voluntarily announced a three percent wage increase to all employees effective September 3.

E. V. Johnson, president, said the three percent increase has been offered to the local branch of the Federal Labor Union at the Kellogg Envelope and Kellogg Container Divisions located at the Cypress St. headquarters of U.S. Envelope.

Last year the company announced an increase of five cents an hour effective August 7, 1950, and on December 8, 1950 another increase of five percent was made effective December 4, 1950.

## SHERMAN OPENS NEW BUILDING

CHICAGO, Ill.—Sherman Paper Products Co. has opened a new Midwest sales office and warehouse at 2245 W. Pershing, supplementing plants on both the East and West Coasts.

The single-story plant is already in production, although more machinery is being installed weekly.

The plant facilities include several truck bays and a railroad loading platform.

## FORM NORTH BRANCH PAPER CO.

North Branch Paper Co. has been chartered by the Secretary of the Massachusetts Commonwealth to carry on a paper converting business established in connection with the operations of the Cascade Paper Co. of North Adams, Mass.

Robert O. Wells, head of the Cascade company, is also president of the new concern, and Elliot E. Howe, office manager for Cascade, is its treasurer. The corporation is authorized for 5,000 shares of no-par-value common stock.

# PEOPLE

R. F. CALDWELL, secretary and treasurer of the E. B. Eddy Co. and of Eddy Paper Co. Ltd., has been appointed a director of Sidney Roofing and Paper Co. Ltd., Victoria, B. C.

JOHN B. KOHL has been appointed general sales manager of Northern Paper Mills, Green Bay, Wis. He succeeds the late Herbert L. Nichols, a veteran of 37 years with Northern.

Mr. Kohl's association with Northern dates back to 1926. It has been marked by a variety of experience in the sales field, including extensive service in the New England, New York, and Chicago areas.

For a period of 12 months during World War II, Mr. Kohl served as the Tissue Industries consultant in the OPA, Washington, D. C. Currently, he is a member of both the Toilet Tissue and the Paper Towel Advisory Committees for the OPA.

JAMES A. PATTERSON, formerly with Haskins & Sells, has joined Eastern Corp., Bangor, Maine, as assistant treasurer. Eastern's new assistant treasurer holds a Massachusetts C.P.A. certificate, is a member of the Massachusetts Society of C.P.A.'s and American Institute of Accountants, and is also a members of the N.A.C.A. Chapter in Bangor, Maine.

CARL H. LUTH has been appointed sales manager of the Ward Paper Co., Merrill, Wis. For the present his headquarters will remain in Merrill, but he can also be reached through the Chicago office of the company.

Mr. Luth has been associated with the paper industry for twenty-three years, fourteen of which have been with the Ward Paper Co. in various capacities. He remains secretary of the company but will relinquish his manufacturing duties to devote all his time to sales and sales service. Associated with Mr. Luth in the sales division are Lee Mills and Frank Hayes, both of Chicago.

MORRIS S. ROSENTHAL, president of Stein, Hall & Co., Inc., has been selected as a member of the United States delegation to the UN Economic Commission for Asia and Far East Regional Conference on Trade Promotion that is being held at Singapore from October 9 to 18. The Conference will discuss international trade and world economic conditions.

HERBERT N. HABERSTROH, JR., has joined the Johns-Manville Celite Division at Cleveland, Ohio.

Mr. Haberstroh joined Johns-Manville in July 1951. He has just finished a period of training at the company's Training Center, Manville, N. J., and returns to Cleveland as a salesman-in-training for the J-M Celite Division there.

R. R. WILHELM, who has been representing The Sorg Paper Co. in the Southern and Southeastern area of the country, has been transferred to headquarters in the Sorg Chicago office. He will represent the company in the Wisconsin, Minnesota, Iowa and Nebraska territory. Mr. Wilhelm will reside in Chicago.

J. J. FISHER has been with The Sorg Paper Co. since 1938, with continual service in the Sales Division since that time with the exception of over three years spent in the Army during the war. Early in 1947 he was assigned to the Chicago Office to assist F. M. Stephens in the handling of accounts serviced by that office at that time, which included, in addition to Iowa, and Nebraska. He has recently assumed additional responsibilities in the Chicago area.

W. T. BAUM, who has been representing The Sorg Paper Co. in the territory west and north of Chicago, has recently been transferred back into the Chicago market.

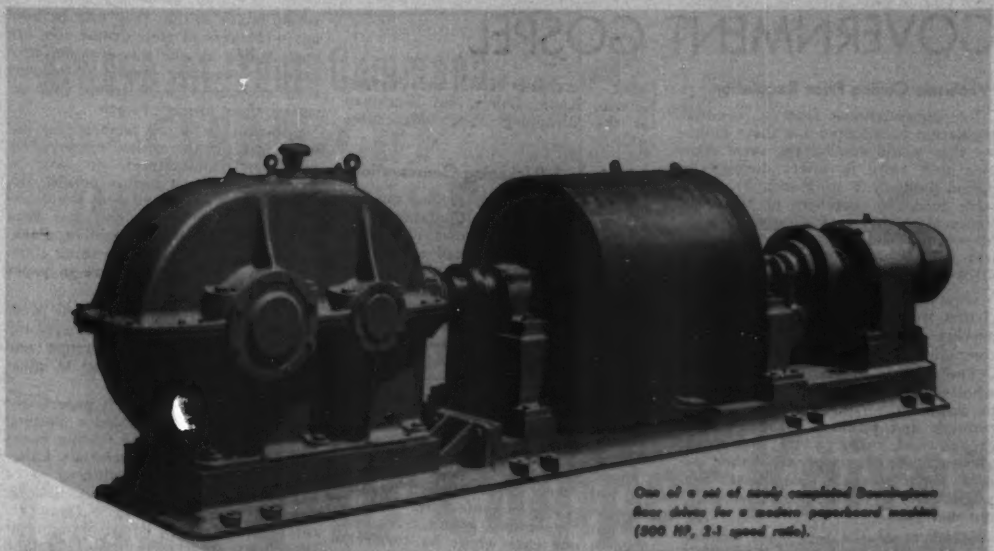
CHARLES E. ALDERMAN has retired from the offices of the Hampden Glazed Paper and Card Co. after 70 years. Officials of the company believe that is a local record for length of service. Mr. Alderman's experience with the firm has ranged from the job of pasting room worker to that of purchasing agent, which latter position he held for the past 20 years.

ROBERT N. WALLIS, assistant treasurer of The Dennison Manufacturing Co., Framingham, Mass., was elected a regional vice-president of the Controllers Institute at that organization's 20th annual meeting, held September 30 to October 3 in the Waldorf-Astoria, New York.

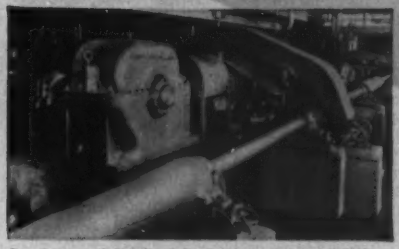
R. P. WOLLENBERG, of Longview, Wash., has been named manager of container operations for the Longview Fibre Co. All three of the box factories operated by the company now are under Mr. Wollenberg's management, as is the box order department at Longview. In addition to the box factory at Longview, the company has plants at Los Angeles and at Oakland, Calif. Mr. Wollenberg is former chief of the engineering division for the fibre company. V. M. SUTHERLING, who has been with the company since 1936, will continue in full charge of the engineering division.

R. A. BROERON will represent The Sorg Paper Co. in the Southern and Southeastern area of the country. He will reside in Atlanta, Ga. Mr. Broeron was at the mill in Middletown, Ohio, and in the Chicago office for the past two years.

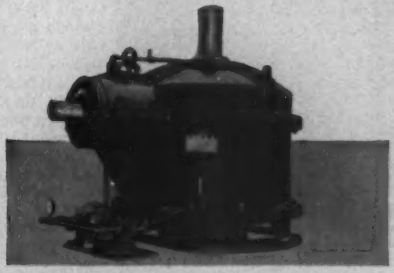
DR. CHARLES M. SIGVARDT has joined the operating department of the Nekoosa mill of Nekoosa-Edwards Paper Co., Port Edwards, Wis. He joined the Scott Paper Co. in a technical control capacity in 1944 and was later named technical control director of the company's Fort Edwards mill. He was advanced to paper mill superintendent and later was assigned to staff technical service covering all mills of the Scott company. Dr. Sigvardt was associated with the Celotex Corp., Chicago before joining Nekoosa.



*One of a set of newly completed Downingtown floor drives for a modern paperboard machine (900 HP, 3-1 speed ratio).*



*Downingtown Spiral Bevel Gear Drives recently installed on a Downingtown reeling felt machine. Note vari-pitch sheaves.*



*Gear Drive designed for a large capacity Downingtown Fibre Pulper.*

# keeping paper machinery ···ON···THE···GO!

Downingtown Spiral Bevel Gear Drives are actually "tailor made" for the machines on which they are to be used . . . whether as replacement equipment or when supplied with new machines. Thus, they keep mill machinery "on the go" more economically and efficiently . . . insure proper speed control and a minimum of horse power loss in the transmission of power.

Consult Downingtown on power transmission for mill machinery.

**DOWNINGTOWN MANUFACTURING CO., DOWNINGTOWN, PA.**

*Pacific Coast Representative: John V. Backlund, Pacific Bldg., Portland 4, Oregon*

**DOWNINGTOWN**

**SPIRAL BEVEL GEAR DRIVES**

**DESIGNERS AND BUILDERS OF PAPER, BOARD AND FELT MACHINES SINCE 1880**

# GOVERNMENT GOSPEL

### Wholesale Ceiling Price Regulation

Recommendations that a tailored regulation be adopted for their industry that would employ the same margins that were in effect during the period January 1 to March 31, 1951, were made by members of the Fine Paper Merchants and Wrapping Paper Merchants Industry Advisory Committees at their second joint meeting with OPS officials.

Under the proposed regulation merchants would apply these margins to current ceiling prices on materials in computing their ceilings.

The ceilings so fixed would apply to wholesale transactions, namely, sales to manufacturers, commercial houses, printers and retailers, of fine, book, groundwood, specialty, newsprint, glassine, waxed, tissue and other papers, paper products, paperboard and paperboard products, and paper packing materials.

Members of the two main committees, and also members of subcommittees which met together earlier, stressed the need of employing a base period subsequent to Korea to obtain normal margins for their industry.

It was pointed out their industry was depressed during 1949 and the first six months of 1950. Moreover, the pricing practices of a substantial portion of the industry during that interval, involving the use of standard pricing books, have been subject to action by the Federal Trade Commission, and cease and desist orders are pending against these practices.

A regulation which would refer back to the pricing practices of this interval would thus be in conflict with the position taken by the Federal Trade Commission, it was said.

The joint meetings of the main committees and subcommittees were conducted by William G. Luke, Jr., industrial consultant for fine and wrapping paper merchants.

Members of the committees present:

Fine Paper Merchants IAC—R. M. Harris, The Alling & Cory Co.; A. W. Leslie, The John Leslie Paper Co.; I. W. Carpenter, Jr., Carpenter Paper Co.; A. T. Bermingham, Bermingham — Prosser Co.; E. P. Magel, Crescent Paper Co.; Wilson Whiting, Whiting-Patterson Co., Inc.; Charles E. Canfield Paper Co., Inc.; and Paul M. Jones, Storrs and Bement Co.

Wrapping Paper Merchants IAC—E. G. Kerwin, Graham Paper Co.; R. H. Knight, Zellerbach Paper Co.; R. E. Knox, Knox and Schneider; Morris Balter, Morris Paper Co.; T. H. Epes, Jr., Epes-Fitzgerald Paper Co., Inc.; C. J. Slicken, Charles F. Hubbs & Co.; and Floyd H. Blackman, Stone and Forsyth Co.

Those attending the subcommittee meeting were Messrs. Carpenter, Bermingham, Magel and Jones for the Fine Paper Merchants IAC and Messrs. Kerwin, Knox, Balter and Blackman for the Wrapping Paper Merchants IAC.

### Containers & Packaging Conservation

NPA said that the second quarter 1951 report of NPA's Containers and Packaging Division shows that shift from scarce metals started soon after the Korean conflict began. The report contains findings of a survey made by Commerce Department filed offices of consumer type containers. It reveals that users are apprehensive over the future outlook of the availability of containers and packaging. Because of this uncertainty, many manufacturers are using alternates for metals and are standardizing and simplifying their products, NPA said.

Citing examples of such conservation measures, NPA pointed to the practice of one manufacturer who is packaging as many as 48 television tubes in one case where he formerly packed each tube separately.

Many grocers are crowding more items into one cellophane or paper bag, thus reducing the number of bags required, NPA said. Grocers also are saving materials by using old cartons and boxes instead of paper bags for "carry-out" groceries. Large corrugated and solid fibre shipping containers also are reused. NPA said reports from Cleveland show more fruits and vegetables being sold in bulk. This represents a substantial saving in all types of consumer packaging.

Programs of standardization to eliminate many sizes of containers are reported from many sections of the country, NPA said. One Baltimore manufacturer of paperboard meat trays reduced the number of different sizes from 20 to seven; a glass tumbler manufacturer has reduced sizes of glass containers for peanut butter. One size is now produced instead of eight. Five sizes of corrugated paper for shipping coffee have been replaced by one standard size.

Other examples of standardization have been noted by NPA. A Midwest manufacturer of heavy machinery has eliminated more than one-third of the sizes of shipping containers formerly used. The spice industry has reduced the number of packages which it uses to four. In the Middle Atlantic area, drug manufacturers have standardized bottles. An initial project in the petroleum industry's standardization program has eliminated oil containers other than one- and five-quart sizes and the one-gallon type.

Extensive programs of container reuse also are under way. In the Baltimore area, many paper bags and containers carry such slogans as "Do Not Destroy or Burn! Sell to Scrap Dealers." A New York department store has elimmated its identifying label on set-up boxes so that they may be used again. Makers of steel drums, too, are contributing to the conservation program by requiring maximum deposits from consumers on all drums, thus assuring their prompt return.

Substitution of one material for another is a further method employed by container manufacturers to save or stretch hard-to-get metals, notably tin, NPA said. Brewers all over the country are relying more on glass than scarce tin for beer containers. Packagers of pet foods also are using glass. Coffee is beginning to move in paper bags instead of cans.

Many packers of such varied products as automobile polishes, linseed oil, asphalts, wax products, syrups and specialty jellies are turning to glass instead of tins, NPA said.

The high price of kraft paperboard has prompted some specialty clothing firms in the East to use folding boxes made of lower quality materials. Laundries in Detroit are substituting paper bags for folding boxes in packing shirts. West Coast hardware manufacturers are reported using fibre drums to replace wooden kegs for shipping nails.

NPA officials commended those manufacturers who are voluntarily supporting conservation and standardization practices and thus conserving critically scarce materials needed for military and defense-supporting production.

### Protest Against Wood Pulp Ceilings

A board of Review hearing on a protest against wood pulp ceiling prices, established under Ceiling Price Regulation 49, was held at the Washington Office of Price Stabilization on September 27.

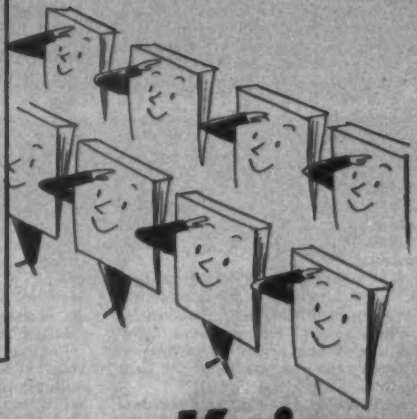
The protestant was the Gould Paper Corp., Lyons Falls, N. Y., which produces printing paper and sells its surplus to other manufacturers.

Basically, the protest was directed at the requirement of CPR 49 that transportation costs up to $16 per ton of unbleached sulphite and of groundwood pulp be absorbed by the seller. The company maintained that, in the case of unbleached sulphite, this absorption requirement would result in a ceiling price approximately $3.60 less than the company's actual manufacturing cost. The company also asked that its protest be considered either as a request for amendment to the regulation or as an application for individual adjustment.

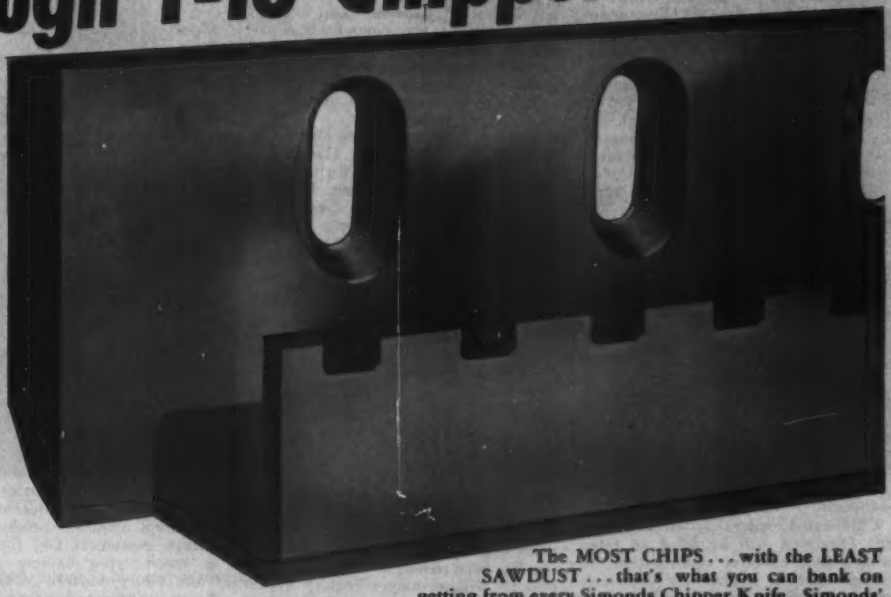
The following issues were discussed at the hearing:

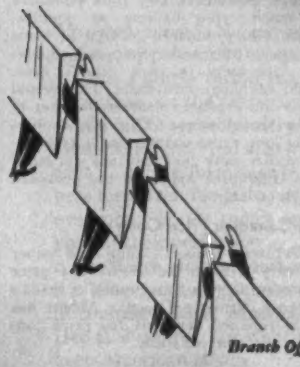
1. Whether CPR 49 is generally fair and equitable in industry-wide application to the manufacture of unbleached sulphite pulp and groundwood pulp if it results in (a) one manufacturer, who sells to other paper makers the excess of its production of these products not required in its own paper making operations, having a ceiling price for unbleached sulphite pulp less

# Always at Your Command...
# CLEAN-CUT UNIFORM CHIPS
## ...when you use
# SIMONDS



# Tough T-18 Chipper Knives





The MOST CHIPS . . . with the LEAST SAWDUST . . . that's what you can bank on getting from every Simonds Chipper Knife. Simonds' own special T-18 Steel has the top toughness it takes to cut clean, evenly-sized chips . . . *and to keep on cutting them,* long after other knives have gone to the grinder. Yes, you'll find there's longer life in a Simonds Knife and more chips in the bin after every run. Get T-18 Knives on your chippers and start saving right now. Call your supplier today!

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than the total of all manufacturing costs, both direct and indirect, and (b) the same manufacturer having a ceiling price on groundwood pulp which returns a reduced profit less than that required to continue profitable production thereof for sale.

2. Whether, if the application of CPR 49 requires a manufacturer of these products to use a pricing plan other than that used prior thereto, it compels a change in a business practice or a cost practice, or method in violation of Section 402 (g) of the Defense Production Act of 1950, as amended.

3. Whether CPR 49 is arbitrary if its application permits competitive Canadian manufacturers of unbleached sulphite pulp to sell at prices higher than the ceiling prices established for domestic manufacturers of the same product.

As provided under Price Procedural Regulation 1-Revised, an official transcript was made of the hearing. Members of the Board of Review will subsequently meet to consider the transcript and all other data and render an advisory opinion to the Director of Price Stabilization.

Members of the Board of Review were: Charles Evans, legal advisor, Forest Products Division, presiding; Lester R. Conley, acting chief, Transportation Branch; and Joseph C. Twinem, head, Miscellaneous Minerals and Metals Section. Also representing OPS was Albert F. Reardon, Office of Boards of Review.

### Chemical Priorities

Only defense ratings issued to the Department of Defense and the Atomic Energy Commission can be used effective tomorrow, to acquire chemicals. All other users of chemicals must buy them through normal market procedure without the assistance of any ratings, the NPA has announced.

This action, taken by issuing Direction 3 to NPA Regulation 2, was necessary to relieve this situation by making certain that vital defense needs are met first and by giving an equal footing to all other users of chemicals.

CMP-rated orders accepted before this Direction will be filled as rated orders, but, effective immediately, no ratings shall be applied for chemicals except those by the Department of Defense or the Atomic Energy Commission.

The only exception will be a Do-Z-1 rating issued by the NPA itself to an essential user of chemicals who is unable to fill his needs in the open market or find an adequate substitute.

NPA said it expects the new type operation to achieve these results:

1. Clear the way for prompt filling of vital defense needs. Until now, these orders have not had to compete with CMP-rated orders and thus were in danger of being delayed.

2. Deflate abnormal demands for certain chemicals which developed through the widespread use of ratings.

3. Encourage conservation and the use of substitutes were possible.

### Domestic Woodpulp Prices Discussed

Members of the Domestic Woodpulp Consumers Industry Advisory Committee met with OPS officials and discussed the levels of prices established under Ceiling Price Regulation 49, the Woodpulp Regulation.

Ceiling Price 49, which has been in effect since June 30, spells out dollars and cents ceilings for 12 standard grades of woodpulp produced in the United States and four standard grades of woodpulp imported from overseas. It does not establish ceilings on woodpulp produced in Canada, principal source of imported woodpulp.

Ceilings on overseas woodpulp are about 50 per cent higher than domestic ceilings. Uncontrolled Canadian prices are 15 to 20 per cent higher than domestic prices.

Committeemen discussed the disparity between domestic, Canadian and overseas prices and the effect on supply that might result from a downward adjustment of overseas pulp ceilings.

Members of the committee, representing paper and paperboard manufacturers, reported no difficulties in the mechanics of operating under CPR 49.

The following members of the committee were present:

Maxwell D. Barden, Lee Paper Co.; Hugo H. Hanson, W. C. Hamilton & Sons; Allen F. Horton, Curtis Paper Co.; Aubrey K. Nicholson, Hollingsworth & Vose Co.; W. B. Zimmerman, Howard Paper Mills, Inc.; Bert H. Cooper, Kalamazoo Paper Co.; and Peter Freedman, American Writing Paper Corp.

Invited representatives of industry present were:

R. G. Hagey, Ohio Boxboard Co.; Walker Hamilton, Riegel Paper Corp.; and A. E. Maves, Continental Paper Co.

### Brazil Frees Newsprint Imports

OTTAWA—All facilities for imports of newsprint and other printing materials needed by newspapers in Brazil are getting a special priority so that the preses can keep rolling and provisions made for bigger future needs, according to official sources here. A law has been passed in Brazil that such imports will no longer require import permits and that they will be given priority in allocation of exchange.

Individual newspapers will be allowed to begin importing under the new law as much newsprint and other necessary materials as they used, on the average, in the previous year. After this quota is filled, they will be allowed to increase their imports, if necessary, by up to 15% over the previous annual consumption.

Requests for exchange covering the foregoing imports into Brazil must be filed by October 10th of each year, said requests to state the amount needed for imports from January 1 to December 31. Other parts of the law stipulate that the Exchange Department will inform the applicant within 20 days of the time he enters his request of its decision and that it will set aside beforehand an "adequate" reserve of exchange in hard currencies.

### Alkali Chlorine Supply

The Alkali Chlorine Industry Advisory Committee was informed on September 19 by the NPA that military requirements of chlorine are posing a problem of supply which must be solved as quickly as possible.

NPA told the committee that the Army Chemical Corps is now increasing its demands for chlorine and suggested the following two ways by which these demands might be met:

1. Raising the percentage of DO rated orders for chlorine which must be placed, accepted and scheduled by producers according to limitations now imposed by M-31. This order, originally issued Jan. 23, 1951, provides for equitable distribution of chlorine and for the protection of public health.

2. Distributing Chemical Corps orders to the industry on the basis of whatever marketable chlorine is available.

NPA reported it is weighing issuance of an order to limit the DO ratings now being placed in the industry. The committee recommended, in the face of the proposed amendment, that the Chemical Corps use DO ratings for its immediate October requirements and that further action be delayed until it is determined how well the new amendment is working.

NPA reported that on the basis of available information, expansion of facilities within the industry will be consummated for the most part by January to provide 600 additional tons of chlorine a day.

The situation regarding tank cars and shipping cylinders for moving chlorine also was discussed. NPA said steel shortages would not allow any construction of tank cars between November and next March. The transportation situation would be made additionally difficult because of the forthcoming increase in chlorine production. NPA said it is considering an order to permit chlorine producers to exchange customers and thus eliminate as much cross hauling as possible. Thus, two producers, located at some distance from each other and supplying customers in each other's area, could exchange customers. This would allow the producer nearest the user to make the shipment. This would eliminate long cross-country hauls and better utilize tank cars and tank car time. The committee approved the proposed NPA order.

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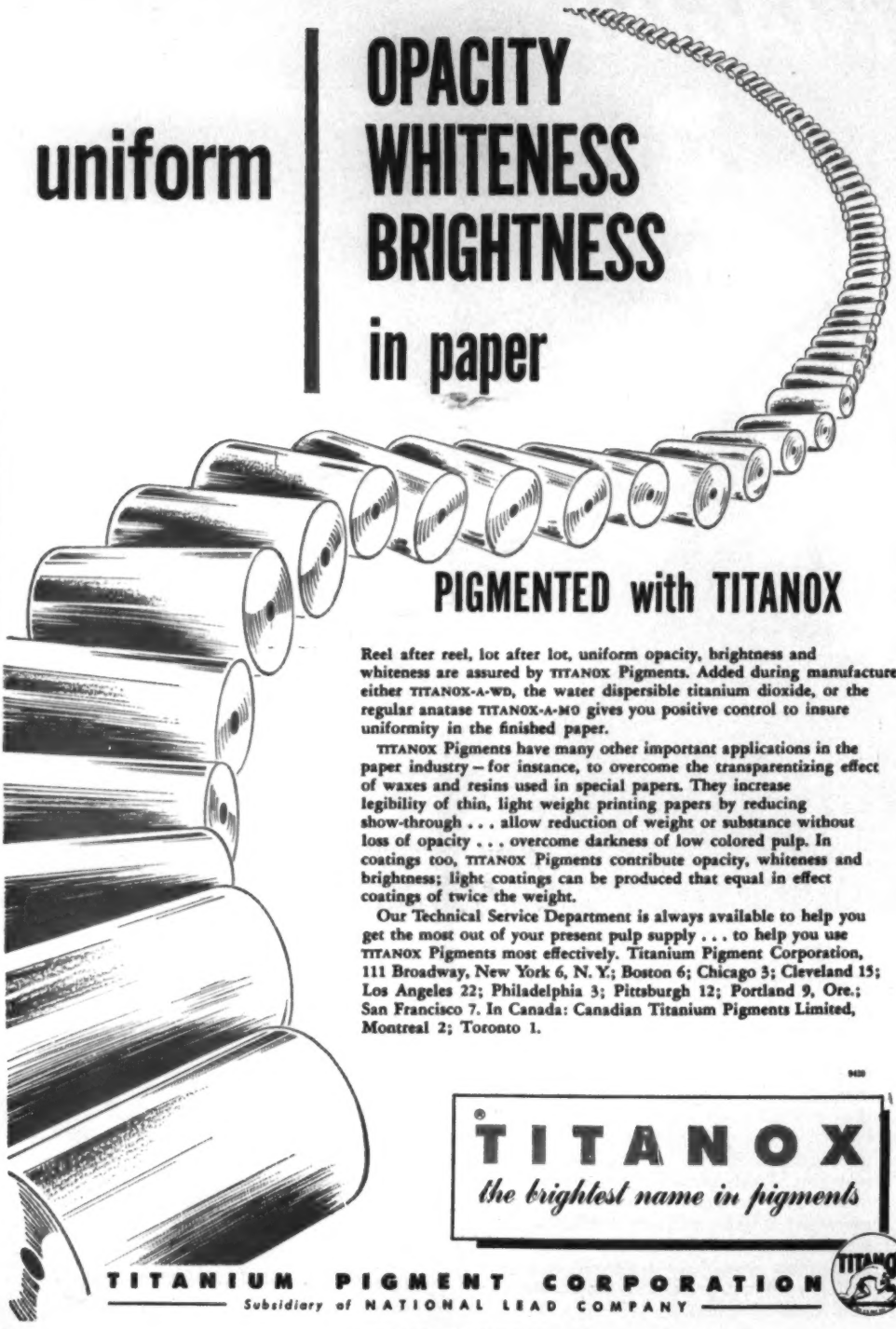

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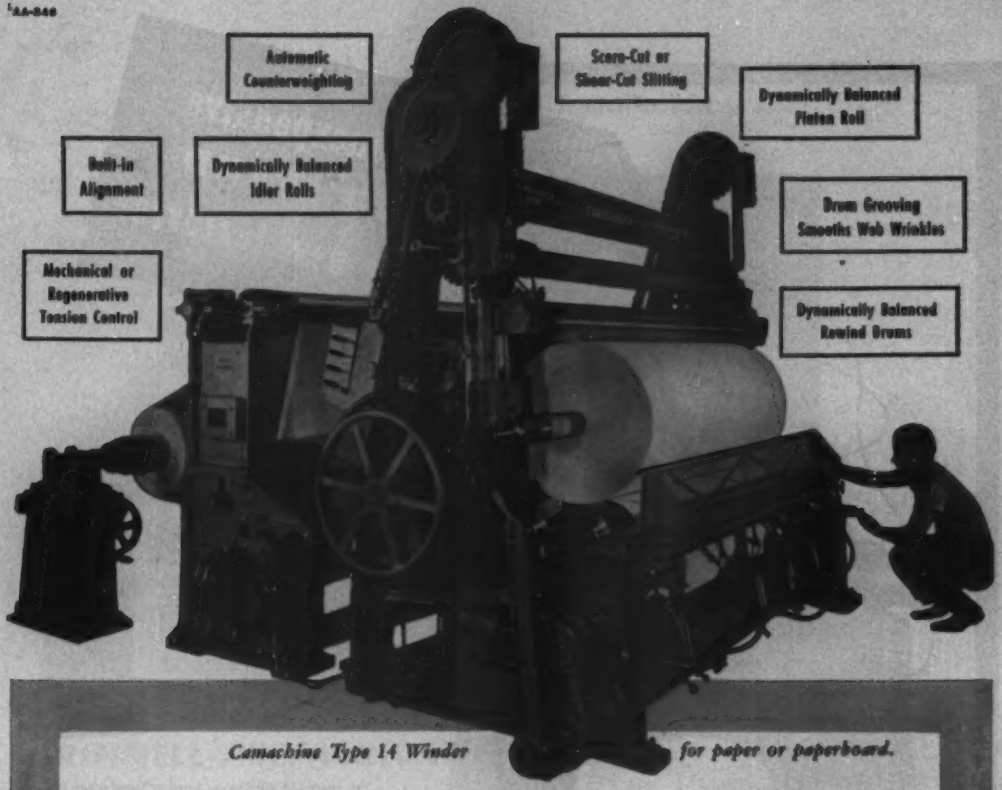


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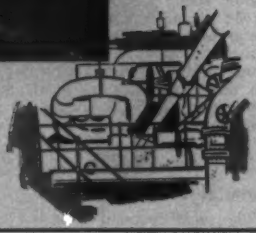

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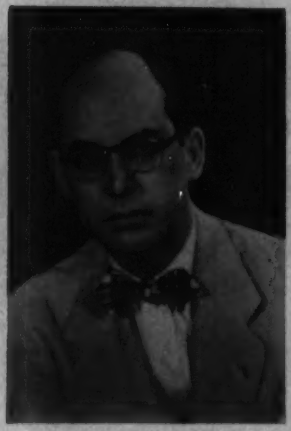
UNIVERSITY OF MAINE LECTURE—No. 1

# Corrosion-Resistant Metals for the Pulp and Paper Industry*



**Daniel L. Horigan**
Development Engineer, Lukenweld[1]

1942—B.S. in Management Engineering, Carnegie Institute of Technology; Plant Layout, Mine Safety Appliances Co., Pittsburgh, Pa.; Process Engineer, Inland Manufacturing, Division of General Motors Corp., Dayton, Ohio; Field Engineer, Cone-Drive Division, Michigan Tool Co., Detroit, Mich.

Much of the equipment used in pulp and paper mills is threatened by corrosion. Before explaining how modern equipment builders guard against such attacks this article will first deal briefly with the various types of corrosion which are apt to be encountered; the second part will deal with the properties of the various corrosion-resistant metals and the forms in which these metals are available; and the final part will deal with specific applications in pulp and paper processing.

## PART I

### Forms of Corrosion

The most common forms of corrosive attack are:

1. *General Attack.* This is what is normally called rusting or simple oxidation and is the type of corrosion most familiar to the average person.

2. *Galvanic Attack.* This type of corrosion occurs in equipment when two metals (or two phases of composition in one metal) are present in an electrolyte, i.e. a solution that will carry a current. Metals at one end of the galvanic series (anodic, electropositive, or least noble) such as magnesium, zinc, carbon steel and others are easily corroded; while the metals at the other end (cathodic, electronegative, or most noble), such as platinum, gold, silver, graphite, Monel and the following (when passive): stainless steels, nickel and Inconel are difficult to corrode. In the complete galvanic table, the relative position of any two metals determines their rate; the closer together, the less chance of corrosion. The relative area of the two metals and their distance from each other will also govern the corrosion rate, provided conditions are such that both anode polerization and resistance drop can be neglected. If the area of the anodic metal is greater than that of cathodic metal, generally no corrosion will occur; if the opposite is true, corrosion of the anodic metal will be very rapid. The electrical conductivity of the solution handled may also affect the speed of attack.

3. *Pitting* (Concentration cell corrosion). Chlorine and certain other reducing solutions in equipment will sometimes cause attack on steels containing chromium; the negative chloride ion in aqueous solutions causing a localized condition known as pitting, or concentration cell corrosion. Pitting results when a local breakdown of the passive film occurs, wherein the anodic area is much less than the surrounding larger cathodic area.

[1] A Division of Lukens Steel Co., Coatesville, Pa.

* A Paper Prepared for the Pulp and Paper Course at the University of Maine. Edited by L. C. Jenness and John Lewis and published by agreement with the Department of Industrial Cooperation at The University of Maine.

Figure 1—Example of severe surface pitting on surface of Type 410 Stainless Plate.

Figure 2—Illustration of effects of concentration cell corrosion. The two sheet samples of Type 304 Stainless (0.08" thick) were insulated and mounted on bakelite washers and exposed to sea water for 60 days. Areas under washer at upper left and at lower right corroded away. Original bolt hole size shown at lower left.

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170

## GALVANIC SERIES TABLE

*Corroded End (Anodic)*

| | | |
|---|---|---|
| | Magnesium | |
| | Magnesium Alloys | |
| | Zinc | |
| | Cadmium | |
| | Carbon Steel | |
| | Copper Steel | |
| | Cast Iron | |
| AISI Types: | 4 to 6% Cr. Steel | |
| (410) | 12 to 14% Cr. Steel | Active* |
| (430) | 16 to 18% Cr. Steel | Active* |
| AISI Types: | Ni-Resist | |
| (301) | 18% Cr., 8% Ni. Steel | Active* |
| (309) | 23% Cr., 14% Ni. Steel | Active* |
| (310) | 25% Cr., 20% Ni. Steel | Active* |
| (316) | 18% Cr., 12% Ni., 3% Mo Steel | Active* |
| | Lead-Tin solder | |
| | Lead | |
| | Tin | |
| | Nickel (Active*) | |
| | 15% Cr., 60% Ni. | Active* |
| | Inconel | Active* |
| | 20% Cr., 80% Ni. | Active* |
| | Brasses | |
| | Copper | |
| | Bronzes | |
| | Nickel-Silver | |
| | Copper-Nickel | |
| | Monel | |
| | Silver Solder | |
| | Nickel (Passive*) | |
| | 15% Cr., 60% Ni. | Passive* |
| | Inconel | Passive* |
| AISI Types: | 20% Cr., 80% Ni. | Passive* |
| (410) | 12% to 14% Cr. Steel | Passive* |
| (430) | 16% to 18% Cr. Steel | Passive* |
| (304) | 18% Cr., 8% Ni. Steel | Passive* |
| (309) | 23% Cr., 14% Ni. Steel | Passive* |
| (310) | 25% Cr., 20% Ni. Steel | Passive* |
| (316) | 18% Cr., 12% Ni., 3% Mo Steel | Passive* |
| | Silver | Passive* |
| | Graphite | Passive* |
| | Gold | Passive* |
| | Platinum | Passive* |

* These designations as active and passive will be covered in Part II. Note that metals in the passive condition are more noble than the same metals in the active condition.

Protected End (Cathodic)

Once pitting starts, it proceeds so rapidly that metal thicknesses alone offer slight protection. (See *Figures 1 and 2.*)

4. *Intergranular Corrosion.* Corrosion of this type is caused by the phenomenon known as sensitization or carbide precipitation. It is a characteristic of the austenitic (chrome-nickel) stainless steels—being the harmful precipitation of a grain boundary constituent in a certain temperature range between 850° and 1500° F. The most serious and most rapid precipitation occurs at the mid-point of this range and can occur as a result of slow cooling through this range or by welding (See *Figure 3*). In a corrosive medium separate grains will flake off from a sensitized stainless steel—giving this type of corrosion its name. The four most practical ways of avoiding sensitization are as follows: 1. annealing the metal—heating it to a high enough temperature and holding it long enough to dissolve all chromium carbides. Temperature range is 1800°-2150° F. and time is usually one hour per inch of thickness. It is then rapidly cooled. 2. Another method is to restrict the time the steel is held in the sensitization range. This may be difficult to do during fabrication. 3. A third method is to lower the carbon content to a .03% to .04% maximum, which prevents the formation of any appreciable amount of carbides. These steels are known as Extra Low Carbon-E.L.C. 4. A fourth method is to add an alloying element to the steel which will have a greater affinity for carbon than chromium and whose carbides will not damage the alloy. Titanium and columbium are the two principal elements used for this. Type 321 is titanium stabilized, Type 347 columbium stabilized. Columbium is on the critical list today, hence Type 304 the low carbon and Type 321 materials are finding extensive current use in lieu of the previously preferred Type 347 stainless.

**Figure 3—Intergranular corrosion (left) is shown alongside butt weld in Type 304, Stainless plate. Plate (right) of Type 321 shows no weld sensitization.**

A similar phenomenon occurs in nickel due to the fact that nickel is not stable and carbon is insoluble in the solid state. Carbon, in the form of graphite, precipitates along grain boundaries and in the grain of nickel in the 700°-1100° range. When operating in this range it is common practice to use low carbon nickel (.02% carbon max.).

5. *Stress Corrosion.* Corrosion of this type occurs in equipment when certain metals are stressed in tension highly enough to produce plastic deformation and are also exposed to the proper corrosive medium. It is believed that this plastic deformation may cause the highly stressed material to become less noble than the less strained material, and the corrosion of the highly stressed material will be accelerated by galvanic effects between the stressed and unstressed portions in the electrolytic solutions. Stress corrosion cracking of steel in alkaline solutions is what is commonly called caustic embrittlement. Failure occurs sometimes through grains, and sometimes along grain boundaries depending upon the metal and other factors. Certain mediums are more conducive to attack than others, chlorides being particularly severe on stainless. This problem has received attention recently because of the costly failures that ensue when it occurs. When this type of corrosion begins, it may proceed to completion within a matter of hours. Salvage or weld repair is rarely posible, even if noticed in time. Proper design and metal selection to reduce high stresses is essential in preventing this type of attack (See *Figure 4*).

6. *Crevice Corrosion.* Closely associated with concentration cell corrosion, crevice corrosion is caused in equipment (*Figure 5*) because a passive film is prevented from forming in a crevice or tight joint and a concentration cell may be set up. Elimination of all crevices, including the use of a crack-free surface, is the best protection.

7. *Erosion-Corrosion.* Continual removal of the passive film is believed to be the principal cause of this type of corrosion in equipment, which occurs under conditions of mechanical abrasion or dynamic flow.

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Figure 4—Stress corrosion cracking in Type 304 stainless plates. Section through crack, unetched, has been magnified about 200 diameters.

8. *Cavitation Corrosion.* This type of corrosion occurs in equipment in the presence of cavitation which is basically a dynamic action within a fluid with a periodic formation and collapse of cavities in regions below the residual absolute barometric pressure. The net result is a deterioration of the surface out of all proportion to what might be expected from simple corrosion. Eddy current areas, orifices, nozzles, pump impellers, and turbine locations are frequent points of attack (See *Figure 6*)

More than one type of corrosion may occur simultaneously, one type frequently leading the others in the same vessel, as will be explained in subsequent sections.

# PART II

## Corrosion-Resistant Metals

This section will deal with the properties of various corrosion-resistant metals and the forms in which these metals are available. The discussion is confined to the nickel-base metals—Monel, nickel, and Inconel—and the stainless steels.

## Nickel-Base Metals

As can be seen in the galvanic series, the nickel-base metals are relatively noble. They require oxygen or some other oxidizing agent for continuation of their corrosion reactions. As a result, they exhibit their highest degree of resistance to acid corrosion under reducing conditions and tend to have their corrosion accelerated by oxidizing acids and compounds.

*Monel.* (63-70% Ni; 30-37% Cu) is most versatile since it resists the attack of mineral and organic acids, alkalies, and salts over a wide range of concentration and exposure conditions.

*Nickel.* Is similar to Monel in its corrosion resistance; it is generally inferior in resistance to acids, about the same in resistance to salts, and a little better in resisting alkalies. "A" Nickel is the wrought form most commonly used. It is commercially pure nickel. The Low Carbon Nickel (0.02% Carbon Max.) is used under conditions mentioned under Part I, Point 4.

*Inconel.* (75% Ni; 12-15% Cr.; 9% Fe) was developed primarily to resist corrosion and tarnishing by foods as well as to protect their purity. It is also superior to Monel and nickel in resisting strongly oxidizing acid solutions and dilute organic acids. However, the oxidizing effect of dissolved air alone is not sufficient to give Inconel an appreciable advantage over Monel or nickel in aerated mineral acids or concentrated organic acids. Inconel possesses superior resistance to alkaline sulfur compounds and hydrogen sulfide at atmospheric and elevated temperatures.

## Stainless Steels*

*Class I.* Martensitic. The principal characteristic of these alloys distinguishing them from other stainless steels is their ability to harden by a heat treatment that produces martensite. Chromium in the lower stainless range (12 to 17%) is the sole major alloy addition, and the carbon is the next most important addition. Carbon has a wide range, and small amounts of other elements may be added, but the metallurgist always views the composition with respect to hardening ability. These steels are therefore popularly referred to as the *martensitic stainless steels* or the *hardenable stainless steels;* also occasionally the *straight chromium stainless steels.* These terms are popularly used interchangeably. Steels in this class are magnetic.

*Class II.* Ferritic. Principal characteristics of this class are a surpassing corrosion resistance and an inability to harden by martensite formation. Chromium in the upper stainless range (18 to 30%) again is the sole major alloy addition. Limited contents of carbon and other minor alloy additions provide no appreciable martensite; the microstructure is predominently "ferrite." Popular terms include *ferritic stainless steel* (because of this characteristic and unchanging ferrite phase); *nonhardening stainless steel;* and again, *straight chromium stainless steels,* or irons. Steels in this class also are magnetic.

*Class III.* Austenitic. The principal characteristics of this Class are the ductile austenitic condition, the work hardening which develops during cold working, and a superior corrosion resistance. Chromium (roughly 8 to 30%) and nickel (roughly 6 to 20%)

* Definitions here are according to "Stainless Steels" Ref. 2, by Carl A. Zapffe, American Society for Metals, 1949.

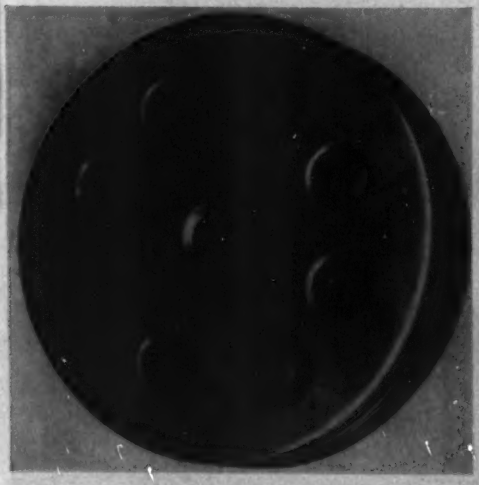

Figure 5—Crevice corrosion in Type 304 stainless disc. Attack occurred underneath three washers which excluded air, when disc was exposed to mild acid attack.

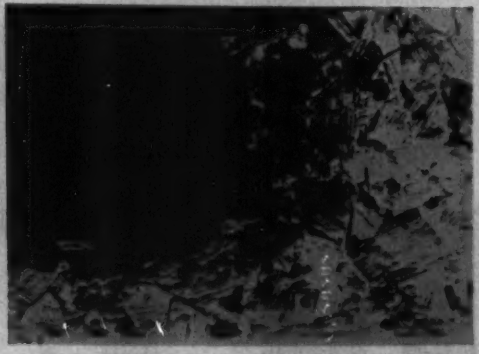

Figure 6—Cavitation corrosion in Type 304 stainless plate shown in photomicrograph (mag. 200x). Sample was cut through corroded section. Solid dark portion shows loss of metal due to cavitation. Metal edges illustrate cold working resulting from attack. White line shows original plate surface.

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both as major alloy additions, with carbon held low. Other elements are added, but with respect to the balance of the austenite phase now made stable by the presence of a major proportion of nickel. An austenitic stainless steel is one which cannot be hardened by heat-treatment. This class is divided into three groups—work hardening, free-spinning and alloy modification. Among developments in the third group are "precipitation hardening" alloys which permit the steel to be worked and formed in the soft condition and then hardened and strengthened at moderate temperatures which neither warp nor oxidize the structure. Popular terminology for Class III includes *austenitic stainless steel* (because of the essentially stable austenite phase); *chromium-nickel, work hardening,* and *18-8 stainless steels.* Steels in this class are non-magnetic in the annealed and unworked condition.

Under AISI (American Iron and Steel Institute) type numbers, the Class I and Class II stainless steels fall in the "400" series; and the Class III stainless steels fall in the "300" series. These type numbers should be used to designate the exact grade of stainless under consideration, rather than simply saying "stainless steel," or giving the broader descriptions shown under the three class headings, as this can avoid unnecessary misunderstandings or even service failure due to improper selection of materials.

*Passivity.* With this general background, the next subject is a discussion of passivity, the phenomenon that makes stainless steel corrosion-resistant.

Passivity in stainless steel is directly dependent upon the chromium content. It is a condition of negligible corrosion, rather than non-corrosion. It is definable as a phenomenon causing impedance to corrosion reactions involving metals and alloys whose tendency other wise is to react with the surrounding medium. Furthermore, passivity is only a relative term, for a steel passive in one medium may corrode in another.

The exact nature of passivity is probably not known but a popular theory assumes the existence of a protective film which greatly retards further attack of the metal and whose existence, or non-existence, determines the difference between being passive and normal activity. A rather simple analogy occurs during the evaporation of water. There the conversion of water into vapor can be likened to corrosion, since the substance is passing into another form through the influence of natural forces. In the open, the water slowly evaporates, or "corrodes" away. However, if the thinest film of oil or paraffin completely covers the surface, the escape of vapor is virtually stopped, and a condition of passivation is attained.

Also in question is the exact nature of the film responsible for the passivation of stainless steel. Without going into the details of this matter, it may be simply said that the presence of a continuous and chemically protective surface layer, possibly an oxide, is not unlikely. There is evidence completely in keeping with the supposition that a protective surface film attempts to form with increasing chromium content, when conditions are oxidizing, and that it rather suddenly completes itself when about 12% of chromium is present in the alloy. (*See Figure 7*) It will probably be safe to assume that with stainless steel an oxide surface layer conceivably forms which is tenacious and quite impenetrable to migrating atoms—either oxygen atoms pressing inward, or metallic atoms pressing outward—thus passivating the corrosion action; and conversely, when that film is destroyed by certain chemical or mechanical action, the steel depassivates (or activates) and becomes liable to attack.

Stainless steel, in their passivated state, rank next to the noble metals in the galvanic series, with the "300" series being more noble than the "400" series. Stainless steels are most resistant to acid corrosion under oxidizing conditions, and tend to have their corrosion accelerated by reducing acids and compounds which destroy their passive film.

### Straight Chromium Types

Type 410 is a straight chromium martensitic containing just enough chromium (11.5 to 13.5%) to attain stainlessness, and minimum of carbon for obtaining a wide range of mechanical properties without incurring either permanent carbides or the demanding care required in handling highly hardenable grades. It is slightly air-hardening when cooled from high temperatures and also has good resistance to oxidation and corrosion at high temperatures with minimum cost. Type 410 with 0.08% max. carbon, and in the clad form, is easier to weld.

*Type 405* is essentially a 12% chromium stock of Type 410, made ferritic by an addition of aluminum instead of further chromium. Just sufficient aluminum is added to prevent important quantities of austenite (and hence, any martensite upon cooling) from forming at elevated temperatures. This feature becomes extremely important during welding—for example, in such operations as lining a digester, since an annealing operation to relieve stresses due to the formation of martensite near the weld would be cumbersome and expensive, if possible at all. The alloy therefore provides dimensional stability and corrosion resistance where great strength or hardness is not required, and at a minimum of expense. It has found an increasing acceptance for high temperature applications due to the better heat resistance imparted by the aluminum addition. It should be noted that difficulty has occasionally been experienced with this type due to a heat having unexplained hardenability.

*Type 430* is similar to Type 410 but with the chromium content increased into the 14 to 18% range without a corresponding increase in carbon or nickel, whereupon half or more of the alloy is converted permanently to ferrite. Thus it has excellent resistance to oxidation, scaling and corrosion at high temperatures. However, the heat-affected zones of welded solid steels of this type may be brittle and have little ductility. In clad steels the overall weld joint efficiency is improved because a large portion of the joint's

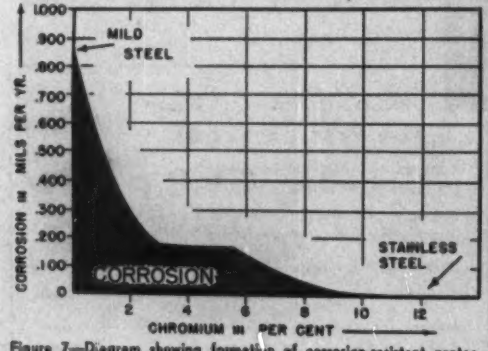


Figure 7—Diagram showing formation of corrosion-resistant protective film. (Courtesy American Society for Metals, "Stainless Steels," Carl A. Zapffe.)

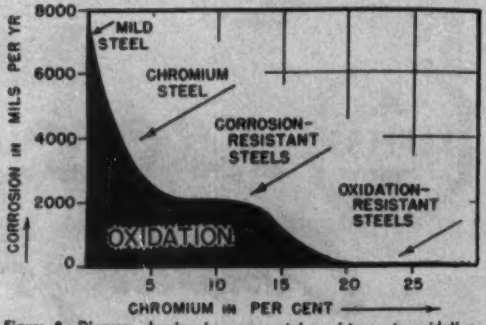


Figure 8—Diagram showing improvement in resistance to oxidation. (Courtesy American Society for Metals, "Stainless Steels," Carl A. Zapffe.)

# 5 practical reasons why the new GULF BLOCK GREASE can help you cut maintenance costs for grease-lubricated dryer roll bearings

Gulf Block Grease provides a new kind of lubricating performance in dryer roll bearings—keeps them operating cooler, and eliminates the need for supplemental oiling.

Gulf Block Grease is manufactured from a high quality lubricating oil and a special soap base under scientifically controlled conditions. The oil provides a protective film as soon as the dryer roll begins to rotate—and is released at the most economical rates over a wide range of operating conditions. It is effective at temperatures as high as 285°F. yet is not excessively hard at low operating temperatures.

It has excellent oiliness characteristics and does not glaze—which means the bearing always gets the protection of an effective friction-reducing oil film, and doesn't overheat or wipe.

Call in a Gulf Lubrication Engineer and ask him to show you how Gulf Block Grease can help you increase bearing life and reduce maintenance costs. Write, wire, or phone your nearest Gulf office today.

Gulf Oil Corporation · Gulf Refining Company
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cross section is carbon steel which is not as subject to grain growth and brittleness as is solid Type 430.

### Chromium-Nickel Types

*Type 301* is a 17-7 chromium-nickel alloy used under comparatively mild corrosive conditions. Its major use is in wrought products where high structural strength can be developed with moderate cold working, such as wire, sheet and strip, under conditions of atmospheric exposure.

*Type 302* is the basic 18-8 type with 0.08-0.2% carbon having excellent corrosion resistance for sanitary and decorative purposes.

*Type 304* is an 18-8 type with 0.08% max. carbon. Due to the limitation of the carbon content, this steel is less susceptible to carbide precipitation during welding than Type 301 and 302 and may be used over a wider range of corrosive conditions without subsequent heat treatment. This material is available with 0.03% max. carbon in solid form and 0.04% max. in clad form.

*Type 309* has a higher chromium and nickel (25-12) content than the basic 18-8 and has superior resistance in a large variety of service conditions combining heat and corrosion. *(See Figure 8)* It is popular for welding electrodes because it produces ductile weld metal.

*Type 310* has the highest chromium and nickel (25-20) content of the austenitic stainless steels regularly produced. It has the best resistance to oxidation at high temperature of any stainless. Its higher cost is an important factor retarding its wider use. It is also popular for welding electrodes for the same reason Type 309 is used.

*Type 316* is the 18-8 type of higher nickel (10% min.) content with the addition of 2.0 to 3.0% molybdenum. It is sometimes referred to as a 16-13-3 rather than 18-8 Mo. The great advantage of the molybdenum is the increased resistance it offers to pitting by solutions containing chloride ions. Type 316 can be used with sulfuric and sulfurous acids, sulfite and cellulose solutions; and is of special service to the paper, pulp, rayon and dye industries. It is available in three special grades — with 0.03% max. carbon in solid form and 0.04% max. in clad form and a columbium-bearing grade — all of which help prevent sensitization.

*Type 317* is the same as Type 316, but with a slightly higher chromium and molybdenum content to further increase resistance to pitting by chloride ions, under atmospheric exposure conditions.

*Type 321* is the 18-8 type stabilized by the addition of titanium to prevent the precipitation of harmful carbides. It (or Type 347) should be used for welded vessels under certain corrosive conditions, or if the service temperature range is 800° to 1600° F., or if the vessel is to be stress-relieved. It may be employed over a wide range of corrosive conditions without subsequent heat treatment and will also withstand heat treatment without becoming sensitized. As titanium cannot normally be transferred through the arc, columbium-bearing (Type 347) electrodes are used for welding Type 321 material.

*Type 347* is the same as Type 321 except that columbium is used as the stabilizing element, to prevent the precipitation of harmful carbides. Columbium forms extremely stable carbides preferentially to chromium and prevents the sensitization phenomenon. This material is used for welded vessels under certain corrosive conditions, or if the service temperature range is 800° to 1600° F., or if a weldment is to be stress relieved.

Next to be discussed is a comparison of four of the physical properties of these various metals in relation to carbon steel. This is important in fabrication and welding, and also in determining suitability of any material for the conditions of heat or heat transfer which may be encountered in a given application.

*Electrical Resistance* of the chrome-nickel alloys is about six times that of plain, or carbon steel, increasing to twelve times when extremely cold-worked; straight chromium alloys have electrical resistance varying from three to six times that of carbon steel; Monel is about five times that of carbon steel; nickel is about the same as carbon steel; and Inconel is about ten times that of carbon steel.

*Heat Conductivity* of the chrome-nickel alloys is about one-quarter of that of carbon steel; one-quarter to one-third as much for the straight chromium alloys; one-half as much for Monel; the same for nickel; and one-quarter as much for Inconel.

*Coefficient of Expansion* of the chrome-nickel alloys is about one and one-half times that of carbon steel; the same or slightly less for the straight chromium alloys; about one-sixth more for Monel; about one-tenth more for nickel; and slightly less for Inconel.

*Melting Point* of the chrome-nickel alloys, the straight chromium alloys, Monel, nickel, and Inconel is just a little less than that of carbon steel.

The variation in these four physical properties, plus the wide variation in tensile strength and ductility, show why corrosion resistance is not the sole factor to be considered in choosing a metal. A fabricator may unwittingly set up ideal conditions for one or more of the common types of corrosion by wrong material selection or by trying to maintain and correct for extremely close tolerances. By proper material specification and proper tolerance limits, this danger can be eliminated.

A consideration of the various forms in which these metals are available will follow. It will simply mention castings, bar, rod, and wire without going into any detail. Plate, sheet, and strip will be dealt with at some length.

### Plate

That group of flat-rolled products over 3/16" thick and 10" wide is known as *plate*. It comes in five general classifications:

1. As hot rolled (most common variety).
2. Heat treated (usually annealed).
3. Heat treated and cleaned or descaled (by pickling or sandblasting; or by sodium hydride descaling of nickel-clad, all types of stainless-clad, and Inconel-clad plate).
4. Heat treated, cleaned, and cold rolled (for plates under ¼" thick).
5. Heat treated, cleaned and polished.

*Clad Steels.* Clad steel plates in flat form are available in three polished finishes:

1. Standard No. 4 Finish—A surface normally furnished when a commercial polish stainless steel is specified. The corrosion-resistant clad surface is ground with consecutively finer abrasives until all imperfections on the face are removed.

2. Luster Finish—Comparable in appearance to a No. 4 sheet finish but is somewhat smoother to the touch. It is not necessarily 100% pit-free.

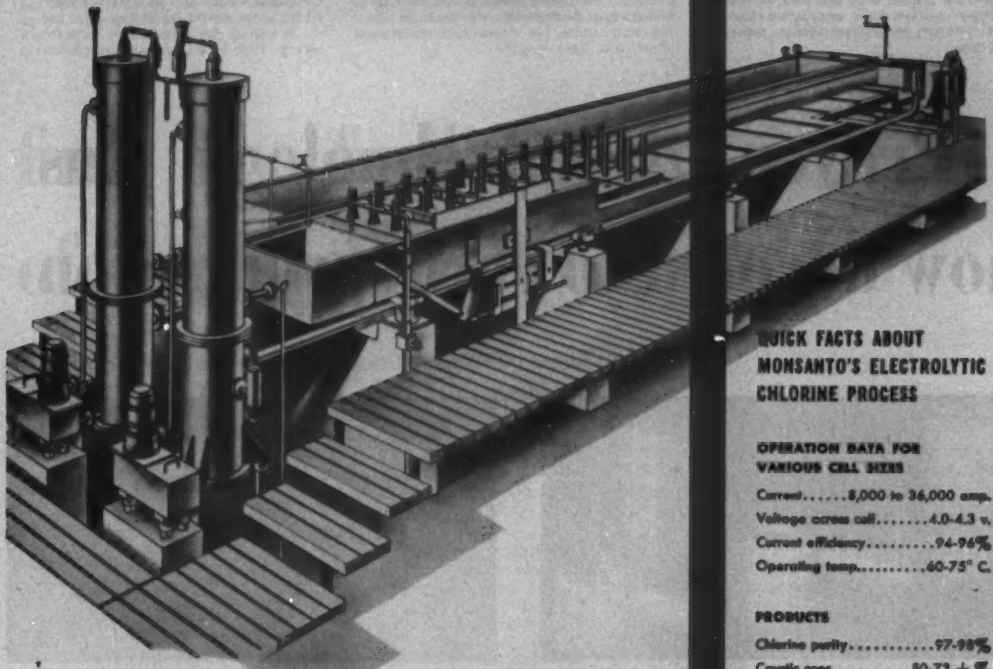
3. Super-Luster Finish—This finish is somewhat brighter and smoother than a No. 6 sheet finish, but not as bright as a No. 7 sheet finish.

### Sheet

A rolled product less than 3/16" in thickness and more than 24" wide is defined as *sheet*. Stainless sheet comes in seven standard finishes:

| *Finish* | *Designation* | *Remarks* |
|---|---|---|
| ..... | Hot Rolled and Annealed. | Dark oxidized surface; satisfactory for furnaces, ports, chutes, or bins. |
| No. 1 | Hot Rolled, Annealed and Pickled. | "White-pickled" surface, suitable for deep-drawing articles not requiring polishing or buffing. |
| No. 2D | Full Finish; Dull. (Same as No. 1 plus Cold Rolled, Annealed and Pickled). | Suitable for forming, spinning, deep-drawing, polishing, or buffing. |
| No. 2B | Full Finish; Bright. (Same as No. 2D plus Cold Rolled). | Bright reflective surface; somewhat less ductile because of cold work. |
| No. 4 | Standard Polished. | Bright polished surface. |
| No. 6 | Standard Polish, Tampico Brushed. | Velvety appearance from dimming No. 4. |
| No. 7 | High-luster Polish. | Extensively polished and buffed to near-mirror finish. |

# You can make your own chlorine, caustic and sodium sulfide



With the Monsanto Electrolytic Chlorine Process, you can solve your supply problems on chlorine, caustic and sodium sulfide. The Monsanto process employs the De Nora mercury-type cell which has been proved efficient and economical in more than 14 years of commercial use. It is the most rugged and compact of all mercury-type cells, requiring a minimum of space and maintenance.

**The Monsanto process offers you the following advantages:**

1. It produces chlorine of 97-98% purity.
2. It is flexible. In addition to chlorine it can make rayon-grade caustic up to 73% without evaporators or purification. It can be operated so one stage of the decomposer produces caustic while the other makes sodium sulfide, or, both can make either sodium sulfide or caustic.

Monsanto offers you a complete service in the construction of your own plants using the Monsanto Electrolytic Chlorine Process. A Monsanto engineer will discuss this service with you, without obligating you or your company. If interested, wire, phone or write MONSANTO CHEMICAL COMPANY, Engineering Sales Department, 1700 South Second Street, St. Louis 4, Missouri.

**QUICK FACTS ABOUT MONSANTO'S ELECTROLYTIC CHLORINE PROCESS**

**OPERATION DATA FOR VARIOUS CELL SIZES**

Current.....8,000 to 36,000 amp.
Voltage across cell.....4.0-4.3 v.
Current efficiency.....94-96%
Operating temp.....60-75° C.

**PRODUCTS**

Chlorine purity.....97-98%
Caustic conc.....50-73 + %
Hydrogen purity.....99.8 ± 0.2%

**CONSUMPTION — Per short ton of chlorine**

Power, d.c. at cell terminals.....3,100 kwh.
Sodium chloride....3,400-3,500 lb.
Graphite anodes.....7 lb.
Mercury.....3-4 oz.

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CHEMICALS – PLASTICS

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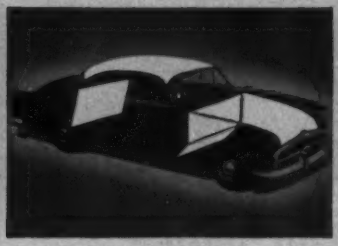
**Automobile tops,** insulated with L·O·F Fiber·Glass against heat and cold, increase passenger comfort. Easy installation. Light weight. Won't deteriorate under normal conditions.

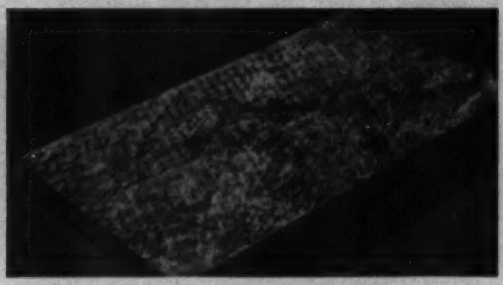


**Automobile sound insulation** a made-to-order job for L·O·F Fiber·Glass. Easy installation in doors, under the dash, on the fire wall, under the hood. Low moisture absorption, light weight.

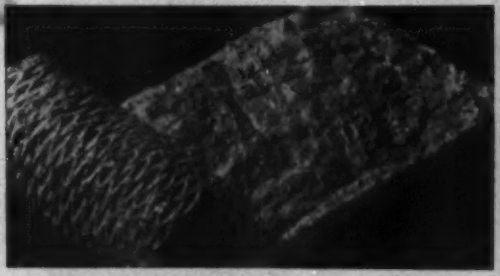
**Aircraft sound and thermal insulation.** Get these advantages of L·O·F Fiber·Glass. Light weight (as low as .3 lb. per cu. ft.). High fire safety. Low moisture pickup. High sound-insulating efficiency.

# Proven glass technology plus now devoted to early production

**Continuous Fiber Textile Yarn**—150 series for many uses, such as electrical insulating tape, sleeving, cloth, roving, and paper reinforcement. Glass fibers have enormous tensile strength . . . 1½ million pounds per square inch and higher. High dielectric strength. Withstands temperatures up to 800°F.



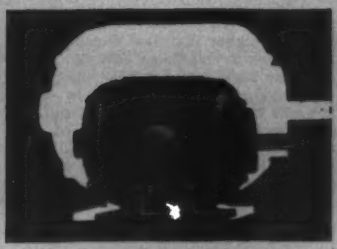
**Super-Fine "B" Fiber**—Splendid thermal- and sound-insulating qualities. Fiber diameter, .00012". Temperature range -0°F. to plus 450°F. Standard roll widths, 18", 24", 36", 72", in 100' and 200' lengths. Other widths and lengths also available in a range of thicknesses and densities.



**Super-Fine "AA" Fiber**—primarily for aircraft insulation. Thickness, .5" with density of .6 lb. per cu. ft. Fibers of incredibly small diameter—.00004". With plastic binder to hold dimensional form. Roll widths, 36", 72", in 50' standard length.

**Roving, Chopped Strand and Textile Yarns**—for reinforcing of plastics, paper, cloth and paper tape, etc. Enormous tensile strength. Won't shrink or stretch. Won't deteriorate under normal conditions. Versatile in application.

Industrial fabrics woven from Fiber·Glass are fine, safe, strong, rot- and mildew-proof. Ideal applications are tarpaulins, flame shields, airplane cloth, reinforcement for plastics.



Electric motors and generators insulated with L·O·F Fiber·Glass withstand heavy overloads. Appreciable space factor advantages! High dielectric strength.

Wire and cable can be served directly with L·O·F Fiber·Glass textile yarns using standard machines. Yarn also ideal for weaving tape, and braiding on wire and into sleeving.

# fine, new facilities of L·O·F FIBER·GLASS!

**Aviation, automotive, textile and electrical industries first to benefit from new, high-quality source of supply being readied by Libbey•Owens•Ford**

HERE IS headline news of *immediate* interest to key men of business and industry.

The resources and advanced technical glass knowledge of Libbey·Owens·Ford are being focused on a new product—L·O·F Fiber·Glass!

With fine, new facilities at Parkersburg, W. Va., placed to serve you quickly, glass technicians of proven ability and experience are getting set to produce top-quality Fiber·Glass products in volume. (See facing page for basic items to be produced. Note above and right for typical applications.)

Across the country, in 24 major cities, L·O·F offices are busy with preparations to give you help on specific uses.

If your company has already discovered the superior qualities of fibrous glass, investigate L·O·F now as a new volume source, worthy of your complete confidence.

If your company now buys other material for electrical insulation, thermal or acoustical insulation, or reinforcing for plastics or paper, L·O·F Fiber·Glass can offer a combination of advantages unmatched by such other materials. This is a chance to benefit from the glass technology and the high standard of quality which you have come to expect from L·O·F!

For technical data, or engineering consultation on Fiber·Glass uses in your business, call your local L·O·F office—or write, wire or phone Libbey·Owens·Ford, Dept. F·G 104, Nicholas Bldg., Toledo 3, Ohio.

Plastic reinforcing, as in this bread tote tray, presents many possibilities with L·O·F Fiber·Glass. Remarkable strength. Won't dent or lose shape. No discoloration of plastic material. Exceptionally long life.

Paper and paper tape reinforced with L·O·F Fiber·Glass can be raised in tensile strength to equal aluminum or even steel! Either Fiber·Glass textile yarns or scrim mesh are suitable. Investigate!

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The finishes are available on one or both sides of the sheet.

Nickel-base sheets come in four standard finishes:

1. Hot rolled.
2. Hot rolled and pickled.
3. Cold rolled.
4. No. 9—Satin finish equivalent to a 180 Grit Finish (No. 4 Finish is 120-150 Grit Finish).

### Strip

A rolled product less than 24" wide, whose thickness may vary from 3/16" down to 0.005" or less is called *strip*. Strip finishes are commonly:

1. Cold rolled, annealed and pickled.
2. Same as 1, with re-rolling.

### Linings and Clad Steels

A further breakdown of available forms of plate material would include field applied linings, shop applied linings, and clad steels. These are combinations of carbon steel plate with a corrosion-resistant alloy.

Field Applied Linings — Of all the methods of applying linings, application in the field is the most costly for the following reasons:

1. It is necessary to scaffold the I.D. of the entire vessel.
2. It is necessary to thoroughly clean the inside of the vessel by sandblasting.
3. To aid in handling and fit-up, lining sheet should not exceed approximately 40" in length and, in digester application, should not exceed 3" to 3½" in width unless clad lining plate is used.
4. The majority of the welds will be made in the horizontal, vertical, or overhead positions in which welding is slower and more apt to produce inferior welds than that done in a flat position. Due to the small size of the liner sheets, a considerable amount of welding must be done.
5. Testing of the quality of attaching welds for the possibility of leaks is almost prohibitive due to the large number of liner sheets applied.
6. Stress relieving after field lining is prohibitive due to the high cost of insulating the vessel and heating it.

A description of the more common methods of field lining of vessels is now given.

*Figure 9*—Strip lining with a straight butt joint. This type of lining is perhaps the most commonly used and is one of the cheapest to apply. It is normal practice to space the plates approximately ¼" apart and to weld a fillet to each of the liner plates and then apply a cover pass over the unwelded section in the center and the two fillets. Alloy content of the electrodes is higher than that found in the liner plate to overcome dilution. Clad steel has been used for field lining, of ⅜" thickness, and is welded in with straight butt joints. The small differences in the physical properties of the carbon steel shell and the carbon steel backing tend to overcome a lot of the difficulties experienced in using a solid light-gauge metal for the liner.

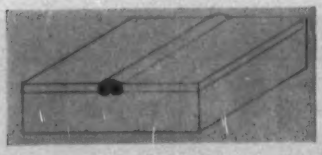

Figure 9—Strip lining with straight butt joint.

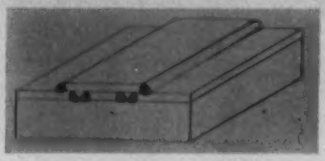

Figure 10—Butt straps over strip lining.

*Figure 10* — Butt straps over strip lining. This type of construction is used in corrosive service where it is desired to provide an additional protection over the joints. This type of construction is expensive and difficulty is experienced in producing satisfactory fillet welds between the liner sheet and the cover plate, as high stresses are present in this type of joint and cracking is often found.

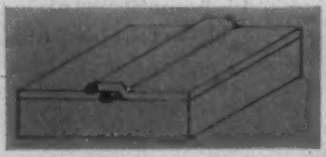

Figure 11—Joggle—or lap—type construction.

*Figure 11*—Joggle- or lap-type construction. This type of construction offers good corrosion resistance but is extremely expensive and difficult to fit up.

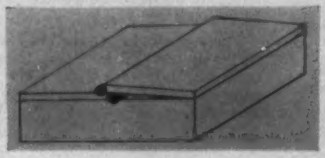

Figure 12—Shingle-type construction.

*Figure 12*—Shingle-type. This type of construction is difficult to fit up.

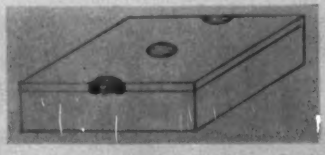

Figure 13—Plug welds.

*Figure 13*—Plug welds. These welds are normally made on 3" x 3" staggered centers using a ½" min. diameter chamfered hole. This is very difficult to apply from the standpoint of the welding, as a weld must be made through 360° around the perimeter of the hole.

*(To be concluded next week)*

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## RESTRICT TIMBER CUTTING

OTTAWA — Deeply concerned by the indiscriminate cutting to meet with heavy demands from New Brunswick for pulp wood, the Province of Prince Edward Island has initiated a new Forestry Advisory Service in that area of Canada and is limiting owners to cutting on two acres per year, with provisions for cutting more on a permanent basis.

However, reports indicate that there is some objections being raised because farmers found pulpwood a good cash crop in an otherwise lean year.

## E. F. McCARTHY APPOINTED

Eugene F. McCarthy of Buffalo, N. Y., has been appointed director of the General Components Division of NPA.

The General Components Division has basic responsibility for the allocation of controlled materials to concerns that make such items as bolts, nuts, bearings, hand tools, valves, and fittings.

Mr. McCarthy had been deputy director of the division. He is on leave from his position as vice-president of Beals, McCarthy and Rogers, Inc., Buffalo, N. Y.

James P. Baldwin will serve as deputy director of the General Components Division under Mr. McCarthy. He had been assistant director.

## CHANGE MATCH BOARD TARIFF

OTTAWA—A tariff change by Order-In-Council is announced by the Canadian Government so that henceforth until July 31, 1952, the under-mentioned product is accorded the tariff treatment hereunder indicated:

Paper board for use in the manufacture of match splints imported by manufacturers of paper matches for use exclusively in the manufacture of such products in their own factories:— British Preferential Tariff, 10%; Most-Favoured-Nation Tariff, 15%, and General Tariff, 35%

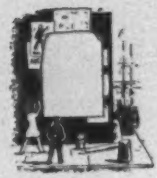
## HYER APPOINTED CONSULTANT

Allan Hyer has been appointed as Consultant to the New Facilities and Equipment Branch of the Pulp, Paper and Paperboard Div.

Mr. Hyer will serve as adviser to the Division with regard to pulp and paper mill machinery and related facilities.

**C**ontinuous

At Ciba, product development and technical services are directed to provide a CONTINUOUSLY advantageous source of supply for dyestuffs.



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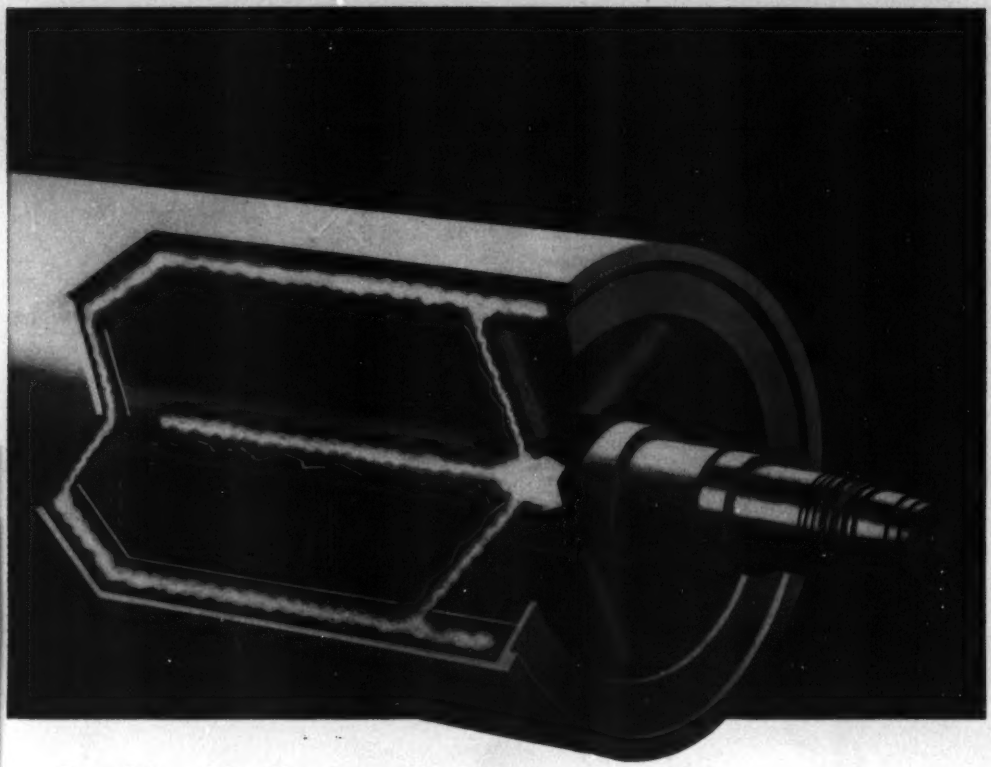


# Double-Shell Construction Assures More Time on Production

Are down-time bandits on your dry end "holding up" production schedules? Then consider the advantages in Lukenweld Jacketed Steel Drier Rolls.

For the double-shell steel plate design of Lukenweld driers permits a speedier return to production. Since these rolls restrict steam to a shallow annular jacket, heat-up is faster—reducing start-up time. Less steam is required for heat-up. Pressure variations are reflected sooner. Operation is much more flexible.

And less down-time is required for maintenance. The syphon pipe, welded in a fixed position, revolves with the roll. So it requires little attention . . . *is virtually maintenance-free.* Condensate is drained with every revolution, preventing the risk of inadequate condensate removal which can result from faulty assembly or alignment. It can be designed to operate with equal efficiency at any speed.

Specify Lukenweld Jacketed Drier Rolls for a bonus in productivity . . . an increase in drying rates up to 50% and more. Jacketed Steel construction assures safe operation at pressures as high as 350 psi.

For engineering assistance on drying problems, write Lukenweld, Division of Lukens Steel Company, 403 Lukens Building, Coatesville, Pa.

*SPEED SALE OF YOUR SCRAP*

***Improved machinery for improved processes through engineering***

LUKENS

LUKENWELD

A DIVISION OF LUKENS STEEL COMPANY

# "Water... Taxes..."

The growing water shortage throughout the nation presents a perplexing problem for industry — says a recent news item.

The same article stresses taxes as another factor of major importance to industry.

The solution to these problems will be found in the Seaboard Southeast. Here we have an abundance of water for all industrial needs.

Taxes are favorable to industry in this area. The "business climate" is conducive to profitable manufacture. That is one of the big reasons why so many industries are coming to the Seaboard Southeast.

Let us give you further details. Our experienced plant location service is available to you without cost or obligation. All negotiations are held in strict confidence.

**Address:** Warren T. White, Assistant Vice President,
Seaboard Air Line Railroad,
Norfolk 10, Va.

# New Equipment

### Mono-Bed Demineralizer

The Mono-Bed Demineralizers have applications in a large variety of industrial operations, wherever exceptionally high purity, completely mineral-free water is required. The unit operates on the most efficient and effective deionizing technique available to industry. Cation and exceptionally strong base anion exchangers are intimately mixed in a single unit tank, thus providing in one container the equivalent of a large number of "multiple bed systems." The raw water passes through this Mono-Bed column only once, yet, the manufacturer stated, comes out with a mineral content of virtually zero. (Resistances have been reported as high as 20 million ohms per centimeter). Models are available in flow rates ranging from a few gallons per hour to 5,000 g.p.h. and up.

Catalog can be had by writing to E. H. Clohessy, General Manager, Penfield Mfg. Co., Inc., 19 High School Ave., Meriden, Conn.

### Fire Detector

A new fire detector which employs a new principle of detection described as *Rate Compensation* is called Detect-A-Fire. The unit has the unique property of giving an alarm precisely at the moment the surrounding air reaches the temperature for which the device is set. For example, if fire warning is desired at 140°F., the detector is preset at the factory for this point. The unit will then operate promptly and without time lag. It is said to have an inherent ability to *sense* dangerous rises in temperature and to anticipate the point at which it should give the alarm.

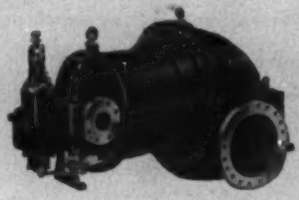
Construction employs a stainless steel *sensing* tube which is always in direct contact with the air. Hermetically sealed within the tube are silver electrical contacts. Expansion of the tube with heating of the surrounding air brings the contacts directly together to sound an alarm or to operate extinguishing equipment. Units are available for either normally open or normally closed circuits. The fixture fits snugly and unobtrusively against the ceiling and is mounted in a curved steel case which lends eye appeal without affecting the unit's performance. It can be installed within new or existing alarm systems, or can be made to actuate an extinguishing system directly.

Temperature settings up to 325°F. may be had. An area as large as 625 square feet can be protected by a single unit. Said to be virtually indestructible, the unit is repeatable, resetting itself accurately after each alarm. The device carries the approval of the U. S. Coast Guard, and Factory Mutuals Laboratories, and is listed by Underwriters' Laboratories, Inc. Manufactured by Fenwal, Inc., Ashland, Mass.

### Multi-Stage Steam Turbine

A newly-designed line of multi-stage, mechanical-drive turbines in ratings from 200- to 5,000-horsepower has been announced.

Designated as Types DP, DR, DRV, and DRVX, the new units have been designed to cover a wide range of industrial applications, as well as for power-generation purposes.



Casing construction on all three multi-stage turbines is similar. From two to ten stages may be used, depending on the steam conditions, application, and desired efficiency. Selection of the number of stages depends on the type of installation desired, it is said.

For design and application details for each of the four types, write to Apparatus News Bureau, General Electric Co., Schenectady 5, N. Y.

### Steam Cost Calculator

A new and modernized "slide rule" type calculator designed to provide a ready means of computing steam costs has been made available by the Cleaver-Brooks Company, Milwaukee, manufacturer of steam boilers and other equipment for the generation and utilization of heat.

The calculator, in handy pocket size, is available without cost to engineers, plant executives, and those who will find it useful in their work. The calculator enables the user to compute the comparative steam costs per 1000 lbs. using coal, oil, or gas . . . and based on fuel costs of price per ton, price

## ENGINEERING SETS

Two engineering sets, known as Techmotion, consist of mechanical elements made of aluminum that can be quickly assembled into many combinations of mechanisms. With the device, the displacement of all points can be readily found, linkages can be altered, gear ratios changed, and new combinations quickly secured to establish the proper mechanisms.

Has application in papermaking and converting machine design. Mechanisms can be studied on the drawing board while in motion, can be quickly altered, combined, etc., to establish fact and authority. For descriptive circular, write to Techmotion Laboratories, Chartley, Mass.

# a new symbol of an old name

Rice Barton Corporation takes pleasure in introducing to you its new trademark which will henceforth appear on all Rice Barton business forms as well as on our papermaking equipment.

It is a symbol of rolls and frame, basic components of papermaking machines, and the horizontal line which represents the product — paper.

As you will appreciate, a company in its 114th year has not chosen its trademark impatiently or lightly. Heretofore, we have used as insignia only the familiar Rice Barton seal which will not be abandoned for its appropriate purposes. Primarily, however, the new insignia fulfills our need for a modern, readily identifiable symbol of Rice Barton equipment.

RICE BARTON CORPORATION

WORCESTER, MASSACHUSETTS

per gallon, and price per cubic foot. On the reverse side of the calculator is an easy-to-use slide indicating Cleaver-Brooks boiler horsepower, pounds of steam per hour, output in BTU, EDR steam in sq. ft. (gross), EDR steam in sq. ft. (net), oil consumption per hour, and gas consumption per hour.

Such terms as boiler horsepower, therms, EDR steam, etc. are also defined. Various grades of oil and BTU gas are also defined. Write to Cleaver-Brooks Co., Publicity Dept., 326 East Keefe Ave., Milwaukee 12, Wis.

# NEW MATERIALS

### Self-Emulsifying Wax

The new synthetic wax, known as Aquawax, purports to duplicate Japan Wax in all essential characteristics. Its unusual property of self-emulsification helps to cut costs and save time in the manufacture of plastic starches, and in the finishing of textiles, leather, paper, thread, and cord. A lasting emulsion can be made from the new wax by merely melting the wax and adding hot water, it is stated.

Manufactured and distributed by Concord Chemical Co., Moorestown, N. J.

### Fourdrinier Wire Patch

Sava-Wire is a prepared patch with a special solder-coated patching cloth for repairing Fourdrinier wires. After selecting the proper size, the patch is placed over the damaged area with soldered side down, and carbon wheel run over the soldered edge of the patch to make a permanent weld. Patches are furnished from ½ inch to 3 inch squares; the coated patching cloth by the square foot.

A valued part of the wire patching equipment is the Fourdrinier Wire Patch Welder which was also designed for repairing other damage to the cloth. Unit is contained in a portable case, and comes equipped with an electric light, sliding rheostat, electromagnet, and accessories. Write to International Wire Works, Menasha, Wis.

### Tar Protective Coating

Coal tar pitch has been compounded by a recently developed process into a fast drying protective coating by breaking it down into minute molecules, then combining it with water and a stabilizing emulsification agent to form a permanent suspension that can be brushed or sprayed.

Available under the trade name Tarlac, the new coating is said to retain all the excellent protective and adhesive qualities of coal tar pitch, to be impervious to oils, greases, other petroleum derivatives, acids, alkalis, water and ctondensation. It will not crack at low temperature or run at high temperature. Good from —56° to

200°F. Recommended by producer as a protective coating for concrete structures, floors, masonry, etc., metals exposed to corrosive elements, mastic floors or other black top surfaces, wooden platforms and other wood exposed to the elements, also for other general protective purposes. Dries to a tough, enduring, flat black film, is completely insoluble in water, oil or gasoline, is thinned when necessary with water and covers up to 300 sq. ft. per. gal. For bulletin and price, write Flash-Stone Co., Inc., 30 E. Rittenhouse St., Philadelphia 44, Pa.

# NEW LITERATURE

*Allis-Chalmers Manufacturing Co.*, Milwaukee 1, Wis. Bulletin 05B7648, "Allis-Chalmers Couplet-Type, Pedestal-Bearing Synchronous Motors." Technical plus sales copy. Illustrated.

*V. D. Anderson, Co.*, 1935 West 96th St., Cleveland 2, Ohio. Bulletin, "Anderson Hi-ef Purifiers." Describes and illustrates.

*Conoflow Corp.*, 2100 Arch St., Philadelphia 3, Pa. Brochure, "Cono Rotomotor." Contains complete engineering data describing outstanding features, dimensions, methods of operation, and various applications of rotomotor.

*Eutectic Welding Alloys Corp.*, 172nd St. at Northern Boulevard, Flushing 58, N. Y. 1951-52 Prize Competition and Program Awards. Open to engineers, metallurgists, researchers, instructors, welders, students and all others qualified. Thirty cash prizes to be awarded, first prize being $500. Write for rules.

*Hercules Powder Co.*, Wilmington, Delaware. Booklet, "The New Hercules Automatic Emulsifier." Features four-color diagrammatic flow sheet enabling readers to follow the flow of rosin size through the process.

*Minneapolis-Honeywell Regulator Co.*, Wayne and Windrim Aves., Philadelphia 44, Pa. Specification sheet No. 412-2, "Liquid Level Controllers." As used to maintain liquid level in surge tanks, stills, towers, feedwater heaters, etc. Specification sheet 408-2, "Diaphragm Motor Valves." As designed for use in pilot plants and other applications where low flows are met and where wide proportional band control systems are needed. Specification sheet 413-1, "Honeywell Vacuum Breakers." As used to protect valuable equipment such as tanks, boilers, reactors, stills and other closed vessels from the damaging effects of a vacuum build-up.

*National Foreign Trade Council, Inc.*, 111 Broadway, New York 6, N. Y. Book, "A Statement on Foreign Economic Policy by the National Foreign Trade Council." 15 pp.

*The International Nickel Co., Inc.*, 67 Wall St., New York 5, N. Y. Technical Bulletin T-2, "Fusion Welding of Nickel and the High Nickel Alloys." Contains 44 pp. and includes more than 30 tables and almost 50 drawings and photographic illustrations.

*Truscon Laboratories*, Detroit 11, Mich. Folder, "Truscon Paratex Rubber Base Wall Coating." No unpleasant odor; no size or sealer needed; etc.

*Remington Rand, Inc.*, 315 Fourth Ave., New York 10, N. Y. Brochure, "Step-Up Your Sales Attack!" Details about application of the Remington Rand Dexigraph photocopies to Sales Management problems.

*Solvay Sales Div., Allied Chemical & Dye Corp.*, 40 Rector St., New York, N. Y. Bulletin No. 9, "The Analysis of Alkalies." 72 pp. of text, tables, charts and indexes. Includes the recalculation of analytical factors to the basis of the 1948 International Atomic Weights, a colorimatric test for iron and copper and a temperature correction table for volumetric solutions.

*Tweco Products Co.*, P. O. Box 666, Wichita 1, Kansas. No. 8 Twecolog. Illustrates and describes complete line of Tweco Electrode Holders, Ground Clamps, Cable Connectors, Terminal Connectors, Cable Splicers, etc. Contains information about the care and maintenance of electric welding cables and connections. Free to those using electric welding process.

*Penfield Mfg. Co., Inc.*, 19 High School Ave., Meridan, Conn. Catalog, "Penfield Water Conditioning Equipment." Describes water conditioning equipment for boiler feed, process and other industrial needs as manufactured by Penfield Mfg. Co.

*John Wiley & Sons, Inc.*, 440 Fourth Ave., New York 16, N. Y. Book, "Forestry in Farm Management." 340 pp. 101 illustrations, 6 by 9¼, $5. Shows how to convert farm forests into farm dollars. Book, "Practice of Wildlife Conservation." 412 pp. Illustrated, 6 by 9¼, $5.50. Presents a biological basis of management. Book, "Principles of Weed Control." 368 pp. 110 illustrations, 5⅜ by 8⅛, $5.50. Tells how to control all types of weeds efficiently, and cheaply.

# LODDING HYDRAULIC OSCILLATING SYSTEM—

**universally applicable—oscillates any doctor on any roll. Space consideration no problem since oscillator occupies no more space than the doctor journal itself. One hydraulic line from each doctor to a master unit which can be located anywhere. One master unit can be used to oscillate as many as eight doctors.**

Actuating cylinder journal of doctor. Note small space requirement.

The Lodding system offers low initial cost, low installation cost, low maintenance cost. This, plus the fact that it will fit anywhere a doctor will fit, including a great many places where oscillation has long been thought impossible, makes the Lodding Hydraulic Oscillating System the complete answer to the doctor oscillating problem.

Master unit serving all doctors oscillated. No valves—no circulating system.

Lodding Engineering Corporation, Worcester, Mass.
Represented by W. E. Greene Corporation,
Woolworth Building, New York.

# The Only Belt Made to Meet the DIAGONAL STRESS of Cone Pulley Drives

Patented

## CONE-MASTER

**In drives embodying taper cone pulleys, with the larger end of one pulley opposite the smaller end of the other, the pull line of the belt is always from high side to high side, or diagonally across the face of the belt. Alexander's patented CONE-MASTER is specifically designed to provide the line of greatest resistance along this line of greatest stress . . . diagonally. In CONE-MASTER each section of each ply is cut so that the backbone line of the hide is parallel to the diagonal line of pull, as shown in the diagrammatic drawings below. The result is a belt that will transmit more power under given tension, will run straighter, eliminate "hunting", will not curl at the edges, and reduces stretch to a minimum.**

**CONE-MASTER is a "must" on cone pulley drives . . . providing the longest service at the lowest belt cost per ton of paper produced. Write for folder giving complete information.**

SINCE 1867

**ALEXANDER BROTHERS**
***Belting Company***

**406 North Third Street, Philadelphia 23, Pa.**

# VALUE in a fine product reflects the experience and skills of its makers.

VALUE in Fourdrinier wires is a matter of record... paper quality and production records in mills throughout America reflect the fact that *Appleton Wires are Good Wires!*

APPLETON WIRE WORKS, INC.
APPLETON • WISCONSIN

# PRICES

**The prices below reflect market quotations in New York at the mill level on standard grades. Does not include spot offerings.**

## PAPER AND BOARD

**Standard News, Delivered Ports**
Rolls, contract, per ton ..... $114.00/116.00
Sheets ..... 130.00/ —

F.a.b. Mills, C.l. Frt. allowed, dock, N. Y.

**Kraft**— per cwt., 40# base wgt.
Standard Wrapping Rolls .....‡ $7.75/$8.00
No. 1 Wrapping Rolls ..... 8.25/ 8.50
Standard Bag ..... 7.50/ —

**Tissues**— per ream 24x36 (480) 19 lbs. 2600 lbs or more

| | | |
|---|---|---|
| Wh. No. 1 Frd. | ‡ $2.25 | /$2.40 |
| Wh. No. 1 MG | 2.25 | / 2.40 |
| Wh. No. 1½ | 1.95 | / 2.05 |
| Wh. No. 2 | 1.75 | / 1.85 |
| Kraft Anti-Tar 20x30 | 2.12 | / 2.25 |
| White Anti-Tar 20x30 | 2.20 | / — |

**Toilet**— per case or 100 rolls—1 M sheets

| | |
|---|---|
| Unbleached 4½x4½ | $8.00/$8.25 |
| Unbleached 4½x5 | 6.60/ — |
| Bleached 4½x4½ | 10.00/12.50 |
| Bleached 4½x5 | 9.85/ — |
| Per Case of 50 rolls—2000 sheets | |
| Unbleached 4½x4½ | $8.00/$9.75 |
| Bleached 4½x4½ | 6.95/ — |
| Per Case of 100 rolls—1000 sheets | |
| Facial, 4½x5, 2-ply | $8.95/10.65 |

**Paper Towels**— per case of 3730

| | |
|---|---|
| Wh. Jr. M'tif'd 9½x9½ | $6.40 |
| Br. Sr. M'tif'd 9½x12 | 4.10 |
| Br. Jr. M'tif'd 9½x9½ | 3.90 |
| Br. Jr. Sgl. fold 9½x10½ | 3.95 |
| Bleached 7½x11, 24/25 rolls | $7.00/7.85 |

**Manila**, per cwt.

| | |
|---|---|
| No. 1 Jute Tag, 100-lb., sheets* | $20.55/22.35 |
| Reg. Jute M.F. 40-lb., sheets* | 19.50/21.50 |
| Wrapping Manila | 8.75/10.50 |
| Printing Manila | 10.50/12.00 |

* Less usual allowance for rolls.

**Gummed Tape**— per bdl., 500 bdls. or more

| | | |
|---|---|---|
| 90-lb. 375 ft. GSI | $7.20 | / — |
| 60-lb. 600 ft. GSI | 7.20 | / — |
| 35-lb. 800 ft. GSI | 8.28 | / — |
| 35-lb. 500 ft. GSO | 6.21 | / — |

## MARKET WOOD PULP

Fourth Quarter Contract Prices. Per Short Air-Dry Ton

| | Varying freight allowances | | On Dock Atlantic Ports | | |
|---|---|---|---|---|---|
| | *U. S. | Canadian | *Swedish | *Finnish | *Norwegian |
| Groundwood | $92.50/ — | $395.00/100.00 | | | |
| Sulfate, Bleached | 145.00/ — | 190.00/200.00 | $230.00/ — | $230.00/ — | $230.00/ — |
| Semi-bleached Sulfate | 140.00/ — | | | | |
| Sulfate, Unbl. | 132.50/ — | 145.00/175.00 | 200.00/ — | 200.00/ — | |
| Sulfite, Bichd. | 140.00/ — | 160.00/175.00 | 225.00/ — | 225.00/ — | 225.00/ — |
| Sulfite, Unbichd. | 132.50/ — | 150.00/160.00 | 200.00/ — | 200.00/ — | |
| Sulfite, Unbl'd (Glassine) | | 164.00/ — | | | |
| Soda, Bichd. | 140.00/ — | 155.00/160.00 | | | |
| Sulfite Screenings | 72.50/ — | | | | |
| Sulfate Screenings | 67.50/ — | | | | |
| Groundwood Screenings | 60.00/ — | | | | |
| Unbichd Sulfate Siderums | 132.50/ — | | | | |
| Stand. News. Siderums | 92.50/ — | 106.00 — | | | |

* OPS Ceiling, CPR 49 ‡ F.o.b. Shipping Point.

**Boards** per ton—

| | |
|---|---|
| Filled News | $107.50/ — |
| Plain Chip | 105.00/107.50 |
| Bichd. Mix. L-d. Chip | 147.50/ — |
| White Pat. coated .020 | 170.00/ — |
| Kraft Liners 42 lb. | 115.00/117.50 |
| Kraft Corr. .009 | 122.50/126.00 |
| Binders Boards | 137.50/140.00 |

The following prices are representative distributors' resale prices:

**Rag Content Bonds and Ledgers**— White, 20 lb.

| Bonds | 4 Ctns. |
|---|---|
| | per cwt. |
| 100% Rag Ex. No. 1 | $70.45/$73.90 |
| 100% Rag | 62.65/ — |
| 75% Rag | 48.15/ — |
| 50% Rag | 38.90/ — |
| 25% Rag | 31.65/ 33.00 |

| Ledgers | 4 Ctns. |
|---|---|
| | per cwt. |
| 100% Rag Ex. No. 1 | $73.65/$73.80 |
| 100% Rag | 63.90/ — |
| 75% Rag | 49.40/ — |
| 50% Rag | 40.20/ — |
| 25% Rag | 33.00/ 34.30 |

**Sulphite Bonds and Ledgers**
White, 20 lb.

| Bonds | 4 Ctns. |
|---|---|
| | per cwt. |
| Watermarked | $19.00/$20.50 |
| Plain | 18.40/ 19.50 |

| Ledgers | 4 Ctns. |
|---|---|
| | per cwt. |
| Watermarked | $20.30/$21.80 |
| Plain | 19.35/ 20.80 |

**White Book**

| Conversion Coated | Case |
|---|---|
| | per cwt. |
| No. 1 | $23.90/$24.65 |
| No. 2 | 22.15/ 23.40 |
| No. 3 | 21.90/ 22.40 |
| Machine Coated | |
| No. 1 | $18.40/$18.90 |
| No. 2 | 16.65/ — |
| Uncoated | |
| No. 1 Antique (Watermarked) | $18.65/$19.65 |
| Offset | 18.65/ 19.90 |
| A Grade E. F. | 18.10/ 19.90 |
| A Grade S. C. | 18.65/ 19.40 |
| B Grade E. F. | 18.40/ — |
| B Grade S. C. | 17.40/ 19.15 |

‡ Indicates a price change.

## WASTE PAPER MARKET

**The following quotations were gathered from major dealers in each market. They are an indication of the price range in which volume tonnage was moving on the date specified. Prices to mills, per ton, f.o.b. cars shipping point (includes brokers' fee.)**

| | New York | Philadelphia | Boston | Chicago |
|---|---|---|---|---|
| | Sept. 28 | Sept. 20 | Sept. 29 | Oct. 1 |
| No. 1 Mixed Paper | $14.00/ 17.00 | $14.00/ — | — /$15.00 | $12.00/ — |
| Boxboard Cuts | 20.00/ 25.00 | 14.00/ — | 23.00/ — | 18.00/ — |
| Mill Wrappers | 20.00/ 30.00 | 18.00/ — | 20.00/ — | 18.00/ — |
| No. 1 News | 16.00/ 19.00 | 15.00/ 17.00 | — / 17.00 | 15.00/ — |
| Over-issue News | 24.00/ 25.00 | 21.00/ 24.00 | 22.00/ 24.00 | 21.00/ — |
| Corrugated Containers | 26.00/ 30.00 | 27.00/ 28.00 | 29.00/ 32.00 | 20.00/ — |
| New Corrugated Cuts | Nominal | 29.00/ 30.00 | 45.00/ 55.00 | 35.00/ — |
| Double Kraft Ld. Corr. Cuts | 80.00/ 85.00 | 75.00/ 80.00 | 90.00/110.00 | 90.00/ — |
| 100% Kraft Corr. Cuts | 120.00/ — | 110.00/115.00 | 110.00/ — | 110.00/ — |
| Used Sugar & Flour Bags | 70.00/ 75.00 | 65.00/ 70.00 | 65.00/ 96.50 | 50.00/ — |
| No. 1 Brown Kraft Paper | Nominal | 70.00/ 75.00 | 70.00/ 90.00 | 35.00/ — |
| Super Resorted Br. Kraft | Nominal | 80.00/ 85.00 | 80.00/105.00 | 75.00/ — |
| New Br. Kraft Env. Cuts | 130.00/160.00 | 135.00/ — | 140.00/160.00 | 120.00/ — |
| New Br. Kraft Cuts | 150.00/155.00 | 120.00/125.00 | 130.00/160.00 | 110.00/ — |
| No. 1 Gdwd Shvs. | 65.00/ 75.00 | 50.00/ 55.00 | 65.00/ 75.00 | 40.00/ — |
| White Newsblanks | 80.00/ 90.00 | 65.00/ 70.00 | 70.00/ 80.00 | 60.00/ — |
| No. 1 Flyleaf Shvs. | 75.00/ 80.00 | 65.00/ 70.00 | 85.00/100.00 | 85.00/ — |
| No. 1 Soft Wht. Shvs. | 150.00/170.00 | 155.00/160.00 | 165.00/185.00 | 150.00/ — |
| Super Soft Wht. Shvs. | 180.00/190.00 | 165.00/170.00 | 180.00/200.00 | 160.00/ — |
| Hd. Wht. Shvs. | 175.00/180.00 | 175.00/180.00 | 180.00/205.00 | 170.00/ — |
| Hd. Wht. Env. Cuts | 180.00/200.00 | 190.00/210.00 | 190.00/225.00 | 180.00/ — |
| New Manila Env. Cuts | 140.00/145.00 | 130.00/140.00 | 130.00/155.00 | 80.00/ — |
| Col. Tab Cards | 105.00/110.00 | 95.00/100.00 | 85.00/110.00 | 95.00/ — |
| Manila Tab Cards | 160.00/170.00 | 155.00/160.00 | 160.00/190.00 | 165.00/ — |
| No. 1 Mixed Ledger | 90.00/ 95.00 | 80.00/ 85.00 | 77.00/100.00 | 95.00/ — |
| White Ledger | 110.00/115.00 | 105.00/115.00 | 105.00/120.00 | 120.00/ — |
| No. 1 Book & Mag.† | 33.00/ 37.00 | 30.00/ 40.00 | 30.00/ 50.00 | 17.00/ — |
| No. 1 Rep'd. Hvy. Books‡ | 43.00/ 50.00 | 41.00/ 47.00 | 45.00/ 60.00 | 40.00/ — |

† Includes Time & Life; no coarse groundwood. ‡ Not to exceed 10% groundwood.

## RAG MARKET

**New Domestic Cotton Cuttings**
OPS Ceiling Price, CPR 28
Delivered Mill Basis

Add 7½% Dealer Commission

| | |
|---|---|
| No. 1 White Shirts | $21.00 |
| No. 1 Unbichd. Muslins | 21.00 |
| Bichd. & Unbichd. Underwears | 21.00 |
| Bichd. Canton Flannels | 21.00 |
| No. 1 Light Silesias | 16.00 |
| No. 1 Light Prints | 11.50 |
| No. 1 Blue Overalls | 14.50 |
| Suntan Khakis | 11.50 |

Add 10% Dealer Commission

| | |
|---|---|
| Fancy Shirts | $10.00 |
| Indigo Blues | 10.00 |
| Mixed Khakis | 8.00 |
| Corduroys | 8.00 |
| Cottonades | 8.00 |
| No. 1 Washables | 6.50 |

**Old Domestic Cotton Rags**
(Prices to Dealers, f.o.b. Ship. Pt.)

| | Per 100 lbs. |
|---|---|
| Mixed White | $5.00/$5.50 |
| Cotton Pants & Overalls | 4.25/ 5.00 |
| Thirds and Blues, Repacked | 4.00/ 4.25 |
| No. 1 Roofing Rags | nominal |
| No. 2 Roofing Rags | nominal |
| No. 3 & 4 Roofing Rags | nominal |

**Bagging**
(Prices to Dealers, f.o.b. N. Y.)
PRICES NOMINAL

| | Per 100 lbs. |
|---|---|
| Foreign Gunny | $5.00/$5.50 |
| Domestic Gunny, No. 1 | 5.00/ 5.50 |
| Heavy Wool Tares | 5.50/ 6.00 |
| Foreign Manila Rope | 8.50/ 9.75 |
| Domestic Manila Rope | 9.00/ 9.25 |
| Jute Strings | 6.00/ 6.50 |
| No. 1 Sisal Strings | 8.00/ 8.25 |
| Paper Mill Tares | 4.25/ 4.50 |
| Foreign Scrap Burlap | 4.25/ 4.50 |
| Domestic Scrap Burlap | 4.75/ 5.50 |
| Austr. Wool Pouches | 7.50/ 8.00 |
| New Burlap Cuttings | 7.00/ 7.50 |

# Now... Buy Wet Strength in the "Large Economy-Size Package"

**OTHER CHEMICALS FOR THE PAPER INDUSTRY**

RHOZYME BB and RHOZYME E-5—*for enzyme conversion of starch.*

TAMOL N—*for effective pitch control —a dispersing agent for pigments.*

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**Aluminum sulfate:**
- comml. bags, wks. ..... cwt. 1.65
- iron-free c.l. ..... 3.35

**Alcohol, ethyl:**
- tax free, dnms. c.l. ..... gal. 1.01 / 1.05½
- deld. East Miss.

**Alcohol, methyl:**
- Synthetic, Zone 1, dnms.
- c.l. fix. allo. ..... gal. .44

**Casein, acid proc.:**
- dom. sh. pt. c.l. ..... lb. .38 / .41½
- imp. ex. dock ..... lb. .28½/ .40

**Caustic soda:**
- c.l. wks. solid, 76%, cwt. ..... 3.35
- dak. & grd. 100-lb. drums ... 3.71
- liquid 50% tanks .... 2.55
- liquid 70% tanks .... 2.65

**China clay:**
- dom. air-float. filler, c.l. wks. ton 16.00
- water-washed, lump, filler .... 11.00
- coating ..... 17.50 /30.50
- imported, ex whse. ... short ton 15.20 /28.35

**Chlorine:**
- single-unit tanks, works ... cwt. 2.70
- multi-unit ..... cwt. 3.26 / 4.40

**Formaldehyde:**
- USP, inh. dms, c.l. wks. ... lb. .0625/ .0675
- l.c.l., E. wks. ..... .0675/ .0725

**Fuel oil:**
- Bunker C, No. 6 Cal. bvy
- tanks, refinery ..... bbl. 1.95 / 2.15
- light ..... bbl. 2.00 / 2.25

**Hydrogen peroxide:**
- USP, 35% cbys. E. of Miss. lb. .33½/ .36½

**Lime:**
- hydrated, bags, wks. ..... ton 13.50

**Rosin:**
- B gum, drums, c.l. Savan. cwt. 7.00 / 9.00*
- G, H, I, K ..... cwt. 8.80 / 9.40*
- FF, wood, do. ..... cwt. 6.60 / 7.30
- * OPS Ceiling, CPR 22.

**Rosin size:**
- 70%, gum & pale grds, tank cars, south, sh. pt. ..... cwt. 7.20 / 7.35

**Salt cake:**
- dom. bulk, c.l. wks. ..... ton 17.00
- wks. frt. all. ..... ton 20.00 /22.00

**Soda ash:**
- light, 58%, bags, wks. ..... 1.38
- bulk ..... cwt. 1.26

**Sodium silicate 40°:**
- turbid. c.l. wks. ..... cwt. 1.30 /
- l.c.l. wks. ..... 1.40 / 1.85

**Sodium peroxide:**
- dms. c.l. E. of Miss. ..... lb. .21
- l.c.l. do. ..... lb. .21½/ .22

**Soybean, protein:**
- chem. isol, wks. c.l. ..... lb. .24 / .28
- Cinn. and Chic.

**Sulfuric acid:**
- 60° Be. cbys. c.l. wks. ... cwt. 1.75 / —
- l.c.l. wks. ..... cwt. 2.05 / 2.85

**Sulfur:**
- crude, c.l. mines, contract, long ton 21.00 /22.00
- f.o.b vessels Gulf .... ..... 22.50 /23.50

**Sulfur dioxide:**
- liquid, comml. cyl. wks. ..... lb. .09
- multi-unit cars ..... lb. .0525

**Starches:**
- pearl corn, bags, c.l. wks. .. cwt. 6.09 / —
- white dextrines, c.l. wks. .. cwt. 7.48 / —
- potato, Idaho, c.l. wks. .... cwt. 5.75 / —
- potato, Maine, c.l. wks. .... cwt. 6.00 / 6.35
- tapioca, conv. dextrines .... cwt. 7.75 / 8.00
- low, Siam, on dock N.Y. ..... 5.75 / — nominal

**Talc:**
- domestic, 50-lb. sacks, c.l. wks. ..... ton 25.00 /30.00

**Titanium dioxide:**
- anastase, c.l. deld., bags .... lb. .21 / .21½
- l.c.l. deld. ..... lb. .22 / .22½
- rutile, c.l. deld. ..... lb. .23 / .23½
- l.c.l. deld. ..... lb. .24 / .24½

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# SUPPLIERS

WHEELCO INSTRUMENTS CO., manufacturers of industrial measuring, controlling and recording instruments, has moved the Western Division Sales Office to larger more convenient offices at 2320 Milwaukee Avenue, Chicago.

This office, under the direction of R. A. Schoenfeld, vice-president and Western Division manager, will serve as a sales headquarters for Wheelco representatives and agents covering the territory from Detroit to the West Coast.

ARNOLD, HOFFMAN & CO., INC., Dyestuff & Manufacturing Division, has opened its new building with offices, sales service laboratory and Warehouse at 370 North St., Teterboro, N. J.

HILLS-McCANNA CO., Chicago, has promoted Fred R. Grassle, secretary of the corporation, assistant to the president. He retains his duties as secretary. R. T. Kidde has been appointed general sales manager of all divisions.

GENERAL ELECTRIC CO.'s Apparatus Marketing Division has appointed Ralston B. Reid of Schenectady, N. Y. In his new position, Mr. Reid will co-ordinate activities of the department's five advertising sections, visual education section, and the company news bureau at Schenectady. Manager of industrial advertising for the department from 1943 until his new appointment, Mr. Reid has served General Electric in news, editorial, and advertising capacities for the past 21 years.

AMERICAN CAR AND FOUNDRY CO. has elected Wilbur E. Lunger a vice-president, reporting to R. W. Ward, vice-president in charge of production. Mr. Lunger was formerly assistant vice-president in the production department. Mr. Lunger was trained in shop work at ACF's Berwick, Pa., plant. In 1916 he was appointed field inspector in the ACF export division and in 1923 became mechanical engineer at Huntington. He was made general superintendent there in 1937 and district manager in 1946. In November, 1949, Mr. Lunger was transferred to New York as assistant vice-president.

**Albert H. Adams**

BAUER BROS. CO., Springfield, Ohio, announces that Albert H. Adams with headquarters in South Portland, Maine, has recently become the representative for the New England territory. He is a graduate of the University of Maine where he majored in chemical engineering. From 1941 until he became a navigator and gunnery officer in World War II, Mr. Adams worked as technical assistant to the kraft mill superintendent of the West Virginia Pulp & Paper Co., Covington, Va. Before joining Bauer Bros. last September, he served as chemist and a member of the research group of Congoleum Nairn, Inc., at their Cedarhurst, Md., felt mill. At first, Mr. Adams will specialize on Bauer Pulp Refiners. Eventually, he will handle the complete line of the company's processing machinery.

HOOKER ELECTRICAL CO. has assigned Harris C. Miller to sales territory comprising upper New York state and western Pennsylvania. Mr. Miller has been with the company since 1941. Since 1949 he has been in sales work both in the New York City area and in the sales offices at Niagara Falls. Mr. Miller's headquarters will be at Niagara Falls, N. Y.

**H. V. Rasmussen**

WORTHINGTON PUMP AND MACHINERY CORP. has appointed H. V. Rasmussen executive engineer at the Wellsville, N. Y., plant.

PAPER MAKERS CHEMICAL DEPARTMENT of Hercules Powder Co. has transferred Spencer H. Hellekson, superintendent of the Milwaukee, Wis., plant, to the department's Savannah, Ga., plant as assistant manager.

The Savannah plant is the largest operated by the Paper Makers Chemical Division. The transfer took place October 1.

E. Marvin Overby, Jr., now assistant manager of the Savannah plant, has joined the administrative staff at the Hercules naval stores plant at Brunswick, Ga.

Keith Martin becomes plant superintendent at the Milwaukee plant, to succeed Mr. Hellekson.

AMERICAN CYANAMID CO. has consolidated its several office and warehouse locations in Los Angeles, Calif., into one newly-constructed building at 2300 S. Eastern Avenue. Open house ceremonies marked the formal opening of the building September 27.

The move is the fourth of its kind undertaken by the company as part of a nation-wide program calling for similar consolidations in other major cities of the United States and Canada.

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# International Symposium

# Appleton

The Institute of Paper Chemistry was the host to the International Symposium on Pulp and Paper, held on September 17 to September 21.

The sessions attended by some 300 scientists from 17 countries started with the subject of Tropical Woods. Many species were discussed which might make commercial grades of paper; however, the problems of difficult solution are economic rather than technical.

The second session was devoted to Agricultural Residues, mainly from the cereal straws and bagasse.

The remarks of Joseph E. Atchison of E.C.A., opened this session: "Yesterday the world pulp and supply situation was outlined to you and the use of fast growing tropical woods as a source of pulp was discussed at great length. Today we will go into another source of fibrous raw material which has been shamefully neglected by many countries in the past and which, I think, has potentialities equally as great, if not greater than tose of the fast growing tropical wood. These materials, the annual and biannual crops, including agricultural residues, mature even faster than the tropical woods and their distribution is such that they are abundant in areas which do not have adequate forest resources of any kind. They include wheat straw, rye straw, rice straw, sugar can bagasse, esparto and a great variety of other grasses which grow abundantly in some areas."

"It has been shown conclusively in many countries that from a technical standpoint the use of these materials for production of pulp gives excellent results. They have been neglected in many countries in the past almost entirely from an economic point of view due to local conditions existing in the countries. This has been particularly true in the United States and Canada where the vast supplies of wood at comparatively low cost have made the use of agricultural residues appear unattractive. However, as more and more of the easily accessible wood supply is contracted for, as the cut of wood continues to rise and as other economic factors change, there comes a time when the use of agricultural residues becomes highly favorable even in countries which have sizable wood supplies. I firmly believe that the opportune time has already arrived in many countries for more extensive utilization of these fibers."

"At the present time over 90% of all the wood pulp consumed in the world is produced in five countries, with North America occupying the predominant position. Even though wood supplies were unlimited in these areas (and this is far from being the case) many countries could still not obtain adequate supplies of pulp because of lack of foreign exchange, excessive cost of transportation and other factors. Therefore, if paper consumption over the world is to increase to any extent at all with the gradually increased standards of living that we all hope for, it is highly important that pulp production be developed in every region of the world. Thus, the use of agricultural residues is particularly important in those countries and regions which do not have adequate wood supplies."

"Western Europe, for example, falls into this category and it is there that the greatest developments have taken place in the utilization of agricultural residues. As a result of my work with ECA during the past three years, I have seen ample evidence in Europe that high quality pulp and paper products can be produced from these fibers. In fact, ECA has been doing everything possible to promote greater utilization of these materials in the Marshall Plan countries. I have seen high quality bleached straw pulp being produced and used in The Netherlands, Italy, France, England, Germany, and North Africa. Furthermore, I have seen on the drawing boards all over Europe many additional mills and expansion of present facilities. ECA is assisting many of these projects. In other countries which do not fall within the Marshall Plan, the Point IV program, the International Bank, the Export-Import Bank and other national and international organizations are actively promoting and assisting projects based on utilization of agricultural residues."

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### History of Straw

Dr. S. I. Aronovsky of the United States Department of Agriculture prefaced his talk with a short history of the use of straw in paper making in the U. S. He said straw was first used successfully in 1831 and until

1863, straw and rags were the sole sources of paper making materials. In 1863, wood pulp began to replace straw for all paper making uses except for the production of corrugated materials which are used in paper boxes and shipping containers. Presently the chief use of straw is in the making of corrugated materials because straw has the necessary stiffness and other properties needed in this type of paper.

In 1940 the USDA started a research program on the use of agricultural residues. Research has developed four new cooking formulas for pulping straw, he said. These have developed ways of pulping straw with a low production cost due to low labor costs and stream requirements and with crush properties, superior even to papers made of hardwood pulp, he said.

L. G. S. Hebbs, Cross & Bevan, England, outlined the difficulties and poor results of cooking straw by the same methods and procedures used in cooking Esparto.

Dr. Harry F. Lewis, dean of the Institute, summarized a paper which was to have been given by Dr. F. M. Muller, Groningen, The Netherlands, who is not attending. He told the group that 404,000 tons of straw pulp is made in The Netherlands annually together with about 100,000 tons of strawboard. Paper makers use rye, wheat and barley straw. The straw pulp is bleached and used to make very high-grade papers.

Dr. E. C. Lathrop of the United States Department of Agriculture, Peoria, Ill., said that compared to woods, the straws have a high ash and high pentosan content, but a low lignin content. This low lignin content, he said, provides for an ease in pulping because less chemicals are required and it is more easily bleached. He said straw produces a short fiber pulp which produces a paper that tears easily and therefore is not suitable for wrapping paper, for example. On the other hand, bamboo and hemp have longer fibers than wood and can be used to make very strong papers.

Dr. Lathrop said the more or less universal use of wood for raw material for pulp is partly due to inertia and that not enough attention has been directed towards the other sources. He also contended that not enough attention has been paid to making a clean pulp from straw but currently, scientists do know how to make a good, clean pulp.

He declared that a process has been worked out to remove the pith from sugar cane at the mill and this pith can be mixed with molasses and used for stock feeds.

Use of these sources of pulping materials is important in relieving the pulpwood shortages, he emphasized. Flax tow, or straw, is used in making cigarette papers and also used, blended with other fibers, in making currency papers. This type of paper has a high tear and high scuff resistance. He also emphasized that straws should be considered as supplements to other fibers, rather than substitutes.

Dr. Alexander Kasser, New York City, speaking of modern industrial pulping of straw and bagasse, reviewed the methods used in the manufacture of straw pulp.

The next session discussed the standardization of methods by the F.A.O., United Nations. It was brought out that F.A.O. could well act as a correlator but that actual standardization would require the work of many laboratories and scientists. The sessions then shifted from F.A.O. problems to more advanced research studies in pulp and paper making.

Dr. E. Adler, of Stockholm, told the scientists why unbleached sulphite pulp reddens when it is stored for several weeks and when moistened with water, develops a definite pink color. He said traces of iron and copper salts must be present for the formation of the red coloration. Air or oxygen also are necessary. Dr. Adler has shown in his researches that the coloration is due to the residual lignosulfonic acid remaining in the pulp. The coloration can be prevented by adding substances which block the action of the iron and copper salts and can be eliminated by oxidation followed by sulphur dioxide treatment.

Professor Masao Horio of Kyoto university, Japan, described the study of paper by an audio-frequency meth-

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od which consists of testing the paper as a vibrating reed. The method is used to obtain a measure of the stiffness of paper. Dr. Borje Steenberg, of Stockholm, gave a critical discussion of the professor's paper.

Dr. Oyvind Bryde, of Vestfos Cellulosefabrik, Vestfossen, Norway, reported on the study of the chemical composition of fibers from beaten and non-beaten pulp. Contrary to the generally accepted view that beating produces only mechanical changes in the pulp fibers, his research indicates that beating also produces chemical changes consisting of degradation of both hemicellulose and cellulose fractions of long fibers as well as fiber fragments.

A discussion of the cause of foaming of unseasoned groundwood was presented by Dr. John W. Green, of the Institute of Paper Chemistry staff. He said the foaming is caused by a dispersion of a very small amount of lignin in the white water. Foaming is reduced when groundwood is made from seasoned wood, he asserted. Seasoned wood doesn't foam as much because of the oxidation of the lignin.

A panel discussion on spent sulfite liquor followed, with Dr. H. F. Lewis acting as moderator.

Lead-off men in the panel were Dr. Heinz Haas, research director of Zellstoffabrik Waldhof of Mannheim, Germany, and Jesse M. Holderby, longtime research chief of the Sulphite Pulp Manufacturers' Research League at Appleton, who now heads the By-products Division of Rhinelander Paper Co. and its subsidiary Lake States Yeast Corp. Messrs. Haas and Holderby are generally considered top authorities on the torula yeast process as well as being expert throughout the field of utililzing and treating spent sulphite liquor.

### Public Pressure

Holderby pointed out that American mills are under pressure from the public stream pollution authorities, most strongly of all in Wisconsin, to find other ways of disposing of the mill liquor than the traditional method of flowing it into the river. Public officials press for this even though it might involve a heavy loss to the mills, primarily with the purpose of keeping out of the stream the wood sugars which use up dissolved oxygen and thus drive out or suffocate fish. The American sulphite industry must accordingly aim its research program at treating the liquor or otherwise disposing of it to reduce stream pollution without incurring costs that could put the mills out of business.

Dr. Haas emphasized that the European aapproach is economic. The primary purpose in Germany, Scandinavia, and elsewhere abroad is to reduce costs of pulp by recovering materials which now are wasted in the liquor. During the war Germany used torula yeast for human food, but this ceased when accustomed foods again were available. Today in Germany, as in the United States, the principal market for this yeast is as a vitamin supplement in animal feeds.

Answering a question, Dr. Haas said that whenever the price of dried torula yeast falls below the production cost, his yeast plant at Mannheim shuts down and lets its spent sulphite liquor run into the Rhine. Holderby contrasted his own company's recent situation, when the yeast plant at Rhinelander continued operating through many months of low prices without selling much of its output. The Wisconsin company tied up several months' production in this inventory and was paying storage charges on more than 1,250,000 pounds of unsold dried torula yeast before it could get out without a heavy loss. All of this was in preference to polluting the Wisconsin river, with untreated spent sulphite liquor.

Oyvind Bryde of Westfossen, Norway, explained how Norwegian mills can profitably evaporate the liquor and burn it as fuel because of the high cost of imported coal. Curt Rosenblad, Swedish engineer now a New York resident, told that the Swedes use about 10 per cent of their liquor in this way and are increasing the proportion. American delegates discussed recent progress on evaporation and burning in the United States.

Bryde and Rosenblad also described the use of spent sulphite liquor for surfacing dirt roads in Sweden, Norway, and Switzerland. William Herriott of Kimberly-Clark Corp., Neenah, explained his company's roadbinder program which this year is treating 700 miles of Wisconsin roads by improved methods which have been developed here.

### Alcohol By-Product

Charles A. Sankey of the Ontraio Paper Co., Ltd., Thorold, Ontario, told how this plant makes industrial alcohol from the sugar in spent sulphite liquor from the sugar in spent sulphite liquor. He explained that this pays a profit at present Canadian prices of alcohol. Dr. E. Gray King of Puget Sound Pulp and Timber Co., Bellingham, Wash., described his mill's alcohol process and the uses that are made of by-products after the alcohol has been extracted. Rosenblad said that in Scandinavia popular brands of aquavit are manufactured from sulphite liquor alcohol and sold under paper mill brand names.

J. Richter Salvesen of Marathon Corp., Rothschild, Warren Lemke of International Paper Co., Glenn Falls, N. Y.; and Dr. Irwin Pearl of the Institute, outlined progress and prospects for converting sulphite liquor into useful chemical products. They specifically discussed present uses in the United States by which spent sulphite liquor is being made into adhesives, dispersing agents, storage battery components, rubber aging retardants, concrete accelerators, tanning agents, flavorings, and pharmaceuticals. The greater quantity of the work described is being done in Wisconsin, by scientists in pulp mill laboratories and industry-supported research groups, and in plants attached to these research units.

It concluded that:

1. Science has not yet found a simple solution for the problem of using or disposing of spent sulphite liquor.

2. As yet no worker in the field can foresee any single solution that will take care of the problem for more than a small proportion of all mills in any country or area.

3. By continuing to work along present lines on both sides of the Atlantic, research scientists will keep on finding and improving methods that will help. The problem is unlikely to be solved all at once, but rather a bit at a time.

The session under Emil Hauser next heard J. K. N. Jones outline "A Method for Isolatiotn and Identification of Sugars Present in Hemicellulose", Paul Lange discussed and illustrated "The Distribution of Cellulose and Hemicellulose in Cell Walls of Pulp", followed by Heinz Haas on "Pulp for Viscose", Freudenberg on the "Formation of Lignin in Wood", and Hot Alkali Stability and Acid Resistance of Modified Cellulose" by Miller.

Later, Professor Whitney conducted a panel discussion on pilot plant problems. It was brought out that the purposes, problems of pilot plant design are much the same regardless of nationality.

# International Symposium

## Montreal, September 24-26, 1951

This meeting was an outstanding scientific event, being the first such major gathering in Canada of distinguished scientists of the western world in the field of wood chemistry research for many years. It was officially sponsored by the Pulp and Paper Research Institute of Canada in cooperation with the National Research Council of Canada, the Chemical Institute of Canada, the Technical Section, Canadian Pulp and Paper Assn., McGill University, Industrial Cellulose Research Ltd., and several major interests in pulp and paper and allied industries.

The principal purpose of the meeting was to increase the knowledge of the structure and possible uses of lignin and other constituents of wood. It is known that lignin and associated materials are a treasure chest of chemicals. Vanillin, alcohol, and some other materials are now derived from lignin, but they represent only the smallest fraction of its total possible use. Ultimately from lignin will be produced organic chemical products which will make the forests more valuable and contribute to raising man's standard of living.

Distinguished scientists throughout the world are working on the problems of wood chemistry. The Pulp and Paper Research Institute of Canada and the other sponsoring groups, are taking advantage of the presence on this continent of a number of these scientists who have been attending scientific gatherings in the U. S. Some 30 distinguished foreign chemists from 14 countries, including several of the most prominent names in the fields of cellulose and lignin research, were present at the symposium in Montreal.

About 200 other scientists from the U. S. and Canada, representing the pulp, paper and textile industries, also participated in this meeting.

Some of the foreign scientists at the meeting included: Dr. E. Adler, Swedish Forest Products Research Laboratory, Stockholm, Sweden; Dr. F. E. Brauns, Institute of Paper Chemistry, Appleton, Wis.; Dr. Oyvinde Bryde, Vestfoss Cellulosefabrik, Vestfoss, Norway; Dr. W. G. Campbell, Forest Products Research Laboratory, Princes Rishborough, Bucks, England; Prof. G. Centola, Cellulose Research Institute, Milan, Italy; Louis Chadeyron, Chief Engineer, La Cellulose du Pin, Gironde District, France; Prof. Stig Claesson, Physico-Chemical Institute, Uppsala, Sweden; Dr. W. E. Cohen, Division of Forest Products, Commonwealth Scientific and Industrial Research Organization, South Melbourne, Australia; Dr. H. Corte, Research Department, Waldhof Zellstoffabrik, Mannheim-Waldor, Germany; Prof. Terje Envist, Professor of Organic Chemistry, Helsingfors University, Helsingfors, Finland; Dr. Karl Freudenberg, Chemical Institute, Heidelberg University, Heidelber, Germany; Dr. H. Haas, Research Department, Waldof Zellstoffabrik, Mannheim-Waldof, Germany; Dr. Erik K. M. Haggiund, Professor in Cellulose Techniques and Wood Chemistry, University of Stockholm, Stockholm, Sweden; Dr. L. G. S. Hebbs, Managing Director, Cross and Bevan, Arlesey, Bedforshire, England; Dr. N. R. Hood, Ph.D., B.Sc., (hons.), F.R.I.C., A.M.I. Mech. Eng., Fellow Univ. Liverpool; Director: The British Paper and Board Industry, Research Association, St. Winifred's Laboratories, Welcomes Road, Kenley, Surrey, England; Prof. Masio Horio, Dept. of

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CAPS

Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

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Samples of caps or cores will be gladly submitted

ELIXMAN PAPER CORE COMPANY, INC.
CORINTH, N. Y.

## AMERICAN PAPER AND PULP ASSOCIATION'S PAPER PRODUCTION RATIO REPORT

(Production as per cent of normal capacity)

### COMPARATIVE WEEKLY SUMMARIES

| | Aug. 25 | Sept. 1 | Sept. 8 | Sept. 15 | Sept. 22 |
|---|---|---|---|---|---|
| 1951 | 100.8 | 95.3 | 78.7 | 99.9r | 99.0 |
| | **Aug. 26** | **Sept. 2** | **Sept. 9** | **Sept. 16** | **Sept. 23** |
| 1950 | 100.6 | 99.2 | 80.0 | 103.2 | 100.3 |

### COMPARATIVE MONTHLY SUMMARIES

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Year Avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1950 | 92.6 | 93.6 | 96.7 | 93.4 | 94.4 | 97.7 | 93.3 | 99.6 | 96.1 | 101.0 | 99.6 | 91.2 | 95.8 |
| 1951 | 99.3 | 101.3 | 101.9 | 102.8 | 102.5‡ | 100.2‡ | 89.4‡ | 98.9‡ | | | | | |

‡ Preliminary.
r Revised.

### COMPARATIVE YEARLY SUMMARIES

| | 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 |
|---|---|---|---|---|---|---|---|---|
| Year to Date | 87.8 | 88.8 | 100.0 | 103.4 | 96.8 | 86.0 | 95.1 | 99.2 |
| Year Average | 88.1 | 89.4 | 101.1 | 104.3 | 96.2 | 88.6 | 95.8 | |

### PAPERBOARD OPERATING RATIOS†

| | Aug. 25 | Sept. 1 | Sept. 8 | Sept. 15 | Sept. 22 |
|---|---|---|---|---|---|
| 1951 | 94 | 93 | 71 | 94 | 90 |
| | **Aug. 26** | **Sept. 2** | **Sept. 9** | **Sept. 16** | **Sept. 23** |
| 1950 | 100 | 100 | 81 | 100 | 101 |

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Year Avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1950 | 88 | 92 | 91 | 92 | 91 | 94 | 82 | 100 | 96 | 102 | 101 | 95 | 94 |
| 1951 | 102 | 105 | 104 | 105 | 104 | 103 | 84 | 94 | | | | | |

All of the above data is based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

Note: The chart shows the ratio through December 1950 on the basis of 6-day capacity. Beginning with January 1950 the ratio is shown on the new basis of normal 6- and 7-day capacities by the colored line. Paperboard operating ratios continue on the basis of a 6-day week.

† Per cents of operation based on "inch-hours" reported to the National Paperboard Association.

## HEAD TABLE GUESTS AT DINNER

Left to right:—Dr. Westbrook Steele, president, Institute of Paper Chemistry, Appleton, Wis.; Dr. Lincoln R. Thiesmeyer, president, Pulp and Paper Research Institute of Canada, Montreal, Que.; Dr. C. J. Mackenzie, Principal Speaker, president, National Research Council of Canada, Ottawa; D. W. Ambridge, president, Abitibi Power and Paper Co. Ltd., Toronto, Ont.; R. L. Weldon, president, Bathurst Power and Paper Co., Ltd., Montreal, Que.

Photo taken on arrival of scientists at Dorval Airport, Montreal, shows left to right:—Messrs. Haas, Brauns, Jones, Eckvist, Mrs. Claesson and Mr. Claesson.

Left to right: Messrs. Freudenberg, Purves, Mark, and Maass, following the second session on the first day of the symposium.

Textile Chemistry, Kyoto University, Kyoto, Japan; Dr. J. R. Istas, Laboratoire du Ministère des Colonies, Tervueren, Belgium; Dr. J. K. N. Jones, Dept. of Organic Chemistry, Bristol University, England; Dr. Lief Jörgensen, Billeruds Aktiebolag, Saffle, Sweden; Prof. Dr. Otto Kratky, Institute of Theoretical and Physical Chemistry, University of Graz, Graz, Austria; Dr. Paul Lange, Swedish Forest Products Laboratory, Stockholm, Sweden; Prof. Dr. W. Lautsch, Organic Chemistry Institute, Free University of Berlin, Berlin, Germany; Dean Harry F. Lewis, Institute of Paper Chemistry, Appleton, Wis.; Prof. Herman F. Mark, Institute of Polymer Research, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.; Dr. A. Meller, Australian Paper Mfrs., Ltd., Melbourne, Victoria, Australia; Dr. Umberto Pomilio, Buenos Aires, Argentina; Dr. L. Rhys, Industria Klabin do Parana de Cellulose, Monte Alegre, Brazil; G. F. Underhay, Bowater Paper Mills Ltd., Bowater, England.

## OBITUARIES

**John A. Lafore,** 78, retired paper manufacturer and engineer, died September 12 at his home in Penn Valley, near here. Mr. Lafore was president of the Lafore-Foster Paper Co., during the First World War, and later became head of the Merion Paper Co. He joined the Lang Paper Manufacturing Co. in 1922 and remained there as vice-president and general manager until 1947, when he retired.

**Thomas W. Harrington,** 69, sales manager for the Crocker-McElwain Co. for 15 years, died recently at his home after a long illness. Mr. Harrington was associated with the Crocker-McElwain Co. for 42 years until he retired in May of 1947 because of poor health.

**Victor A. Ryan** Director of Research, Crown Cork & Seal Co., died September 20, after a short illness. Recognized as a national authority in paper technology and lubrication, Mr. Ryan joined the research staff of the Crown Cork & Seal Co. in 1936 as Paper Technologist. In 1939, in addition to his work with paper, he became Chief Lubrication Engineer for the company. In 1940 he was made Director of Research.

# CLEARING HOUSE

## HELP WANTED

### MEN WANTED—POSITIONS OPEN

We can place—general manager to take full charge of mfg. and sales for new paper converting plant; managers (2) for board mills; supt. board mill; plant supt. for folding box mfg. plant; asst. supt. Cylinder board mill; asst. supt. Fordrinier fine paper mill.

Master mechanics, mechanical engineers and plant engineers, salaries up to $10,000 year; designer for machine tools; safety engineer; chemical engineer for pulp mill; head of maintenance and steam plant, salary $6,000 to $8,000; industrial engineers; machine tenders, back tenders and beater engineers; salesman for industrial products for New York City.

LIST YOUR CONFIDENTIAL APPLICATION WITH US to keep informed of attractive positions open in the pulp and paper mills.

CHARLES P. RAYMOND SERVICE, Inc.
294 Washington St., Boston 8, Mass.
SPECIALISTS IN PLACING PULP AND PAPER MILL EXECUTIVES O-5

### PAPER MILL ENGINEERS

Engineering construction organization with extensive pulp and paper mill projects under way has immediate openings in New York office for paper mill design and layout Engineers. Please give complete engineering and biographical background in first letter. Write Box 51-509 care Paper Trade Journal. O-5

### INTERESTING OPPORTUNITY

ASSISTANT PAPER MILL SUPERINTENDENT—Needed immediately for old established company in New England area. The man we are looking for should be a high school graduate with some courses in paper technology and management. He should be fully able to supervise paper mill production, maintain favorable labor relations with employees, and work closely with management.

If you have the qualifications we are seeking, please write Box 51-496, Paper Trade Journal, giving us a complete resume of your background. Salary open. Address Box 51-496 care Paper Trade Journal. O-5

## HELP WANTED

### AMBITIOUS MECHANICAL ENGINEER WANTED

Must be well grounded in Papermaking and Finishing. Must have desire, drive and capacity to tackle all phases of our operation, including engineering, shop superintendency and sales. Salaried position.

If ability shown, will share top management in small, but long established Massachusetts manufacturing firm.

Write complete resume, including age, technical experience, marital and military status.

All replies confidential. Our personnel knows of this advertisement.

*Address Box 51-503, care Paper Trade Journal.* O-5

### RESEARCH DIRECTOR

Career opportunity for chemical engineer or chemist to establish and head up research department responsible for product improvement, also new product development, also process development of three paper mills producing kraft and sulphite converted products. Box 51-488 care Paper Trade Journal. O-12

WORKING SUPERINTENDENT for small fast growing Eastern mill making lightweight specialties. Cylinder machine experience essential. State qualifications and salary expected. Address Box 51-87 care Paper Trade Journal. TF

### WANTED

A man experienced and fully capable for small, growing Bag Department in Eastern paper mill. Should be experienced in adjusting and production on new Potdevin Notion Bag Machines. A fine opportunity for growth and advancement for the right man. Location is ideal for living and education. Address replies Box 51-491, c/o Paper Trade Journal. O-19

## HELP WANTED

WORKING SUPERINTENDENT:—Take charge Converting Dept.—Must be thoroughly experienced maintenance and production napkin folders, roll tissue and towel perforators, towel and toilet interfolders, sheet tissue equipment. References required. Good starting salary, excellent future growing concern. Locate New England. Reply Box 51-506, care Paper Trade Journal. O-19

SALARIED POSITIONS $3,500 to $25,000. We offer the original personal employment service (established 41 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars. R. W. BIXBY, INC. —517 Dun Bldg., Buffalo, 2, N. Y. TF

WANTED—Master Mechanic or Assistant for modern 3-Machine Tissue Mill. Progressive management; expansion program now under way. Fine opportunity for young/middle aged man to advance. Substantial paper mill mechanical experience with electrical background desirable. Give complete resume of experience in letter to Box 51-443 care Paper Trade Journal. Replies held strictly confidential. TF

### WANTED

MECHANICAL ENGINEER for three-machine pulp and paper mill. Fine opportunity for young, aggressive and experienced engineer who can handle Maintenance and his department efficiently. Ideal living conditions for family and education. Address Box 51-492, c/o Paper Trade Journal. O-19

WANTED — Machine Tenders and Back Tenders for corrugating medium and liner mill, Fourdinier and cylinder machines. Located in Western Pennsylvania; good working conditions; pleasant surroundings and very good labor relations. Call, collect—Terentum 14/6, TARENTUM PRODUCTS CORPORATION, Terentum, Pa. TF

WANTED — SALES ENGINEER — Experienced in Pulp and Paper Mills, for sales and service work in the South. Excellent opportunity with old established machinery manufacturer. In reply give resume of education, experience and current salary. Address Box 51-482 care Paper Trade Journal. O-12

WANTED—Experienced Foreman to take charge of converting department in paper mill manufacturing toilet paper, towels and napkins, located in the East. Must be familiar with the equipment and obtain steady production. Pleasant surroundings in small community. Address Box 51-494 care Paper Trade Journal. O-5

MECHANICAL ENGINEER — Midwest glassine and greaseproof mill desires a young mechanical engineer to work as project engineer. Five years pulp or paper mill experience desirable but not essential. Permanent. Write Rhinelander Paper Company, Rhinelander, Wisconsin. O-5

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Address replies to advertisements appearing under Box Numbers in care of PAPER TRADE JOURNAL, 15 West 47th Street, New York 18, N. Y.

## HELP WANTED

SUPERINTENDENT for Maintenance and Modernization; Machine Tender; Back Tenders; for Fine Paper Mill Eastern New York. Address Box 51-501 care Paper Trade Journal. O-26

## SITUATIONS WANTED

WALLBOARD ENGINEER—with graduation from Swedish technical college and with 8 years experience in the Swedish wallboard industry/insulation, hard, ultra hard, desires responsible position. Address Box 51-473 care Paper Trade Journal. O-5

CHEMICAL ENGINEER—30 years technical and management experience, paper coating, coated abrasives, coating and converting machinery, resins and specialties. Desire technical or production position with established company. Address Box 51-471 care Paper Trade Journal. O-12

SUPERINTENDENT — Thoroughly experienced papermaker desires to make new connections. Conventional or Yankee Fourdrinierc, light and heavyweight specialties. References. Address Box 51-467 care Paper Trade Journal. O-19

## SITUATIONS WANTED

PERSONNEL DIRECTOR—Fifteen years experience Pulp and Paper industry, supervising functions of industrial relations department. Experience includes labor negotiations and contract procedures. Address Box 51-500 care Paper Trade Journal. O-19

## FOR SALE

FOR SALE—64" Seybold Paper Cutter; 36" and 63" Cameron Slitter/Rewinder; 6" Brightwood; Int'nl. Folding Box Gluer; 30" and 44" Hartford Platen Die Cutter; 72" S & S Rotary Slitter/Creaser; Knowlton Spiral Tube Winder & Recutter like new; Complete Set-up Box Machines. Write for listings and prices. Address Box 51-467 care Paper Trade Journal. TF

PAPER COATING MACHINERY MANUFACTURERS — Waxing, Oiling, Carbon Laboratory Coating and Treating and Flat Ream Measuring and Converting Machines. New improvement. THE MAYER MACHINE COMPANY, INC., 1313 Buffalo Road, Rochester, 11, N. Y. TF

FOR SALE—One 6" Brightwood machine, complete with collapser. Many extra parts, complete range all size forms, serial number 1074. ALLEN CARTONS, INC., Dayton, Ohio. O-12

## FOR SALE

### FOR SALE

**Three Trimby 72" Rotary Knotters, Stainless Steel Plates.**
**One Oliver Young type 8' x 8' Vacuum filter.**
**Two Pulp Bleaching 8' x 6' Vacuum filters.**
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**One Impco 8' x 6' Washer Thickener for tile vat with separately driven repulper.**

**Address Box 51-481 care Paper Trade Journal**

O-12

FOR SALE—52" Cameron type 8 Model 5 Slitter; 48"Kidder Model CH shear cut slitter; 76" Cameron Rewinder; 73" Moore & White Upright 2 drum Reel; 42" Moore & White Sheeter; 100" Dillon Sheeter, Thomas W. Hall Company, Inc., 120 West 42nd St., New York, 18. O-5

FOR SALE—Guyton Cumfer Guillotine Strawboard Cutter, 14' blade. Address Box 51-497 care Paper Trade Journal. O-5

## FOR SALE

**1—Sandusky Couch Roll—126" drilled face x 22" diameter.**
**1—123" 3 bowl revolving reel.**

**BEARINGS**
72—Top and bottom Dryer Bearings 7" diameter x 12" long.

**BEATERS**
1—Dilts Iron Tub Laboratory Beater. Beater roll 14" diameter x 10¾" face.
1—Noble & Wood Cast Iron Beater—1000# capacity—roll newly rodilled.

**CALENDER STACKS**
1—9 roll 68" Calender Stack.
1—2 roll pressure calender—32" x 108".
1—72" 4 roll calender stack. (Extra heavy duty).
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2—30" diameter x 72" face.
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1—48" diameter x 72" face.
3—36" diameter x 76" face.
1—30" diameter x 92" face.
1—36" diameter x 72" face.

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1—#6½ Reeves Drive.
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1—Reliance Electric Drive, complete with 5 gear head motors.
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1—Complete unit, consisting of 6 dryers, 30" diameter x 38" face, including frames, gears, anti-friction bearings.
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1—36" diameter x 142" face.
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2—Dryers 48" diameter x 134" face.
1—24" diameter x 92½" face.
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1—64" diameter x 48" face.
1—60" diameter x 68" face.
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1—20" diameter x 61" face, complete with frames.
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1—60" Cutter.

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1—6 plate Shartle Flat Screen.
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Write us regarding your requirements.

**PRESSES**
3—Sets Primary Presses, complete, 148" face. Anti-friction bearings. Also all types of rolls for 148" wet end.

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Various cuts and assorted pulleys.

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*Various sizes of Centrifugal and Plunger Pumps. Write us regarding your particular requirements.*
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1—123"—3 bowl Revolving Reel.
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Felt, Table, Press, Breast, Couch, etc. Various sizes and types. (Bronze, Rubber, Iron, etc.)

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2—Savealls, 36" diameter x 136" face cylinder molds, iron end vats.

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1—63" Clark Sheeter, 8 roll backstand.

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1—119" 2 drum Waldron
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1—42" Johnstone Slitter.
1—62" Cameron—Type 10.
1—72" Cameron—Type 10.
1—36" Langston.

**STOCK PUMPS**
1—10 x 20 Shartle Duplex.
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1—Sandusky Couch Roll 126" drilled face x 22" diameter.

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2—136" face Suction Boxes.

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1—77" Rogers Wet Machine.

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1—48" Face x 84" Diameter, Frames & Bearings.
1—60" face x 60" diameter including frames and anti-friction bearings.
1—64" face x 60" diameter, including frames and bearings, also 2 dryers 20" diameter x 64" face.

**We are always in the market to purchase your surplus or idle machinery. What have you to offer? Wanted Cylinder and Fourdrinier Machines (complete mills).**

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**AC MOTORS (3 ph. 60 cy.)**

| HP | Make | Wdg | Spd. | Type |
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| 600 | G.E. | G.E. | 450 | CWC |
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| 150 | G.E. | G.E. | 600 | IR |
| 150 | West. | Wes. | 577 | |
| 150 | G.E. | G.E. | 1200 | A M |
| 125 | All-Ch. | G.E. | 720 | ARX |
| 125 | West. | Wes. | 720 | |
| 100 | G.E. | G.E. | 1200 | IR |
| 100 | G.E. | G.E. | 1720 | IR |
| 75 | West. | G.E. | 1200 | CW |
| 75 | West. | G.E. | 600 | CW |
| 75 | G.E. | G.E. | 1720 | IR |
| 60 | West. | G.E. | 1720 | CW |
| 4-50 | G.E. | G.E. | 1720 | KT |
| 40 | G.E. | G.E. | 1200 | KT |
| 30 | West. | G.E. | 575 | CW |
| 25 | Wes. G.E. | G.E. | 1200 | KTSM |
| 25 | 440 v. West. | G.E. | 1760 | CSCM |
| 25 | Gr. Wk. | G.E. | 900 | |
| 25 | West. | G.E. | 1720 | CS |
| 20 | Al. Ch. (Sour) | G.E. (Hi-Tors) | 1165 | ARWNR |
| 20 | West. | G.E. | 1720 | CS |

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| HP | Make | Wdg | Spd. | Type |
|---|---|---|---|---|
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| 10 | West. | G.E. | 1750 | CSCSC |
| 7½-(3) | Al.Ch. | G.E. | 1750 | AIY |
| 7½ | G.E. | G.E. | 1750 | KT |
| 7½ | West. | G.E. | 1750 | CSCSCY |
| 5 | West. | G.E. | 1750 | CS |
| 5-11½ | G.E. | G.E. | 600/1750 | MRA |
| 5 | Reeves | G.E. | 1150/50 | PA |
| 5 | Sprg. | G.E. | 575 | KMS |
| 5 | West. | G.E. | 1750 | |
| 5 | Wes. West. | G.E. | 1750 | CSCSC |

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| KVA | MAKE | PHS. | SEC. |
|---|---|---|---|
| 1500 (3 PH) | G.E. | 2300 | 575 |
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1—60" 3 roll friction Calender Stack. All iron rolls.

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1—14' Globe Digester, including drive.

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Two or Three Paper Machines, Cylinder or Fourdrinier, Trim 44", 48" diameter dryers chromium plated. Will rebuild to make any kind of paper and capactiy to meet your needs.
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TF

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20 New Anti-friction Bearing Felt Stretches. Brass screws 1½" dia. complete with hand wheels and ratchet 12 Sets Spring Roll Brackets with 1-7/16" and 1-15/16" bearings.

**Osborne Paper Mill Equipment Corp.**
FULTON, N. Y. — New Tel. #3-4254
O-26

## FOR SALE

1—136" Fourdrinier Paper Machine with dryers 42" dia., 132" face. Can furnish 13 or 33 dryers to suit your needs. Will rebuild machine to make grades you desire.

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FOR SALE—PAPER COATING RODS—Wire wound EQUALIZERS and blank rods. DE NEVE & CONSLER CO., Box 817, Rochester, 3, N. Y. O-5

FOR SALE—One type I, form K, 50 HP General Electric motor, 440 V, 3 ph, 60 cycle, 900 rpm. Also, one 50" Langston rewinder. Can make rolls up to diameter 40". Address Box 51-504 care Paper Trade Journal. O-26

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**SOUTHERN KRAFT MILL REJECTS**
**AT PRICES IN EXCESS OF FIBRE VALUE**
WIDTHS: 12" to 72"
WEIGHTS: 30# to 120#
DIAMETER: 9" to 60"
CONSIDER US BEFORE RE-PULPING YOUR REJECTS.

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LAWRENCE, Massachusetts — O-5

WANTED—W & P Shredders, Evaporators, Generators and Boilers, Slitters, Cutters, Hydraulic presses, Sheridan Presses, Dryers. Address Box 51-89 care Paper Trade Journal. TF

WANTED—Brightwood Box Machine, Shredders, Evaporators, Generators and Boilers Slitters, Cutters, Hydraulic presses, Sheridan Presses, Dryers. Address Box 51-88 care Paper Trade Journal. TF

HOT WAXER WANTED—Give complete information and price. ALLEN CARTONS, INC., Dayton, Ohio. O-12

**CLASSIFIED ADS BRING RESULTS**

## WANTED

## WANTED

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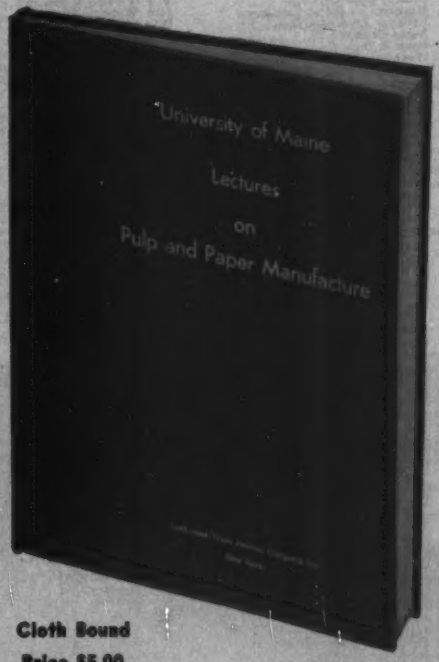


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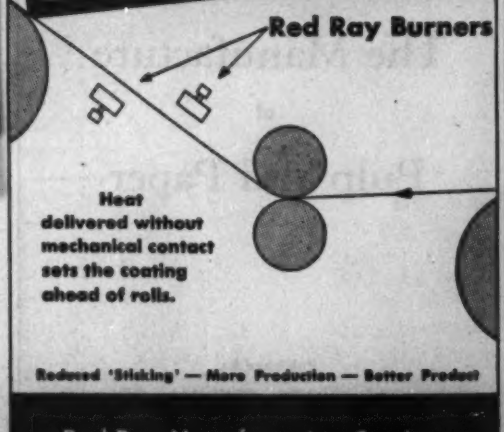


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Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Stroh Process Steel Co.
Valley Iron Works Co.
Westinghouse Electric Corp.
Western Gear Works

**GRAPPLES**
Blaw-Knox Company

**GRAVITY FILTERS**
Holyoke Machine Co.

**GRINDERS**
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Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Lobdell United Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Works

**GRINDING WHEELS**
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Simonds Abrasive Co.

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Gilbert & Nash Co.
The Moore & White Co.
Mount Hope Machinery Co.
Rice Barton Corporation
John Waldron Corp.

**GUMMING MACHINES**
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Egan, Frank W., & Co.
The Sandy Hill Iron & Brass Works

**GUMS**
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Westinghouse Electric Corp.

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General Electric Co.
D. J. Murray Mfg. Co.
Red Ray Mfg. Co., Inc.
Rose Engineering Corp., J. O.
Nichols Steam Specialties Co.
Valley Iron Works Co.

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**HUMECTANTS**
Aktivin Division, Heyden Chemical Corp.
Nopco Chemical Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

**IMPREGNANTS**
American Cyanamid Company, Industrial Chemicals Division
B. F. Goodrich Chemical Co.

**INDENTING MACHINES**
Dilts Machine Works

**INDUSTRIAL TRACTORS**
Clark Equipment Company, Industrial Truck Division
Towmotor Corp.

**INKOMETER**
Thwing-Albert Instrument Co.

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Bunge Pulp & Paper Co.
Cambridge Instrument Co.
General Electric Company
W. & L. E. Gurley
B. F. Perkins & Son
Photovolt Corp.
Taylor Instrument Co.
Testing Machines, Inc.
Thwing-Albert Instrument Co.
Williams Apparatus Co.

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Beloit Iron Works
Johnson Corp.
Lovejoy Flexible Coupling Co.
Rice Barton Corporation
Shartle Bros. Mch. Co.

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Bahr Brothers Mfg. Co.
E. D. Jones & Sons Co.
Shartle Bros. Mch. Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

**KNIVES**
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Hamblet Machine Co.
Heppenstall Company
E. D. Jones & Sons Co.
The Moore & White Co.
Simonds Saw & Steel Co.
Taylor Stiles & Co.
Valley Iron Works Co.

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Fibre Making Processes, Inc.

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Thwing-Albert Instrument Co.

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Bird Machine Company
Dilts Machine Works
W. & L. E. Gurley
Egan, Frank W., & Co.
E. D. Jones & Sons Co.
Taylor Instrument Companies
Testing Machines, Inc.
Valley Iron Works Co.
John Waldron Corp.
Williams Apparatus Co., Inc.

**LAMINATING MACHINES**
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Dilts Machine Works
Egan, Frank W., & Co.
Rice Barton Corporation
John Waldron Corp.

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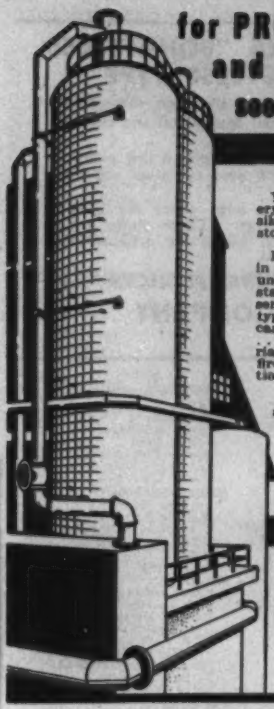

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Sinclair Refining Co.
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Rice Barton Corporation

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Bagley & Sewall Co.
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Lukenweld
Moore & White Co.
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Ross Paper Machy. Corp.
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Shartle Brothers Machine Co.
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Valley Iron Works Co.

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Hudson Sharp Machine Co.
Jagenberg-Werke Akt. Ges.
Langston Co., Samuel M.

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Moore & White Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

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Thwing-Albert Instrument Co.

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Crane Company
Grinnell Company
Michigan Steel Casting Co.
National Tube Co.
Walworth Company

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Armco Drainage & Metal Products, Inc.
Crane Company
Grinnell Company
Michigan Steel Casting Co.
Walworth Co.

**PITCH CONTROL**
American Cyanamid Company, Industrial Chemicals Division
General Dyestuff Corp.
Monsanto Chemical Company
National Aluminate Corp.
Nopco Chemical Co.
Rohm & Haas Co.

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American Cyanamid Company, Industrial Chemicals Division
Aktivin Division, Heyden Chemical Corp.
B. F. Goodrich Chemical Co.
Naugatuck Chemical Division of U. S. Rubber Co.
Nopco Chemical Co.

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Gibbs-Brower Company, Inc.
Perkins & Son, Inc., B. F.

**PLATES**
Armco Steel Corp.
Babcock & Wilcox Co.
J. O. Ross Engrg. Corp.
Lukenweld Division
Lukens Steel Company
Timken Roller Bearing Co.

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Black Clawson Company
E. D. Jones & Sons Co.
Shartle Brothers Machine Co.

**POPE TYPE REELS**
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Manchester Machine Co.
Rice Barton Corporation

**PRECISION SAMPLE CUTTER**
Testing Machines, Inc.
Thwing-Albert Instrument Co.

**PRESERVATIVES**
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General Dyestuff Corp.

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Beloit Iron Works
Rice Barton Corporation

**PRESSURE FILTERS**
Holyoke Machine Co.

**PRESSURE VESSELS**
Chicago Bridge & Iron Co.
Combustion Engineering-Superheater, Inc.

**PRESSES**
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Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Hudson-Sharp Mch. Co.
The Moore & White Co.
Potdevin Machine Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.
Waldron Corp., John
H. G. Weber & Co., Inc.
Williams Apparatus Co.

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Lovejoy Flexible Coupling Co.
Rice Barton Corporation

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Thwing-Albert Instrument Co.

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Rosser Fdy. & Mach. Co.
Shartle Brothers Machine Co.

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Bauer Brothers Co.
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Morden Machines Co.
Shartle Brothers Machine Co.

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Lyddon & Co. (America), Inc.
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Perkins-Goodwin Co.
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Nash Engineering Co.
Roots Connersville Blower Corp.
J. J. Ross Company
Ross Paper Machy. Corp.
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Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

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Red-Ray Mfg. Co., Inc.

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General Dyestuff Corp.
Rohm & Haas Co.

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B. F. Perkins & Son, Inc.
Taylor-Stiles & Co.

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Chicago Bridge & Iron Co.
Combustion Engineering-Superheater, Inc.
Moore & White Co.
D. J. Murray Mfg. Co.
Pusey & Jones Corp.
Ross Engineering Corp., J. O.
Valley Iron Works Co.

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The Bagley & Sewall Company
Beloit Iron Works
Black Clawson Company
Dilts Machine Works (Kohler Systems)
Egan, Frank W., & Co.
Downingtown Mfg. Co.
Hudson-Sharp Mch. Co.
Moore & White Co.
Rice Barton Corporation
Rodney Hunt Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
The Smith & Winchester Mfg. Co.

**REFINERS**
Appleton Machine Co.
Bahr Brothers Mfg. Co.
Bauer Brothers Co.
Dilts Machine Works
Gibbs-Brower Company, Inc.
E. D. Jones & Sons Co.
Morden Machines Co.
Murray, D. J., Mfg. Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Sprout Waldron & Co., Inc.
Sutherland Refiner Corp.
Valley Iron Works

**REGULATORS**
APMEW, Inc.
Allis-Chalmers Mfg. Co.
Bird Machine Company
General Electric Co.
Johnson Corp.
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Taylor Instrument Companies

**RESINS**
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B. F. Goodrich Chemical Co.
The Goodyear Tire & Rubber Company
Hercules Powder Co.
Monsanto Chemical Company
Naugatuck Chemical Division of U. S. Rubber Co.
Napco Chemical Co.
Plaskon Division, Libbey-Owens-Ford Glass Co.
Reichhold Chemicals, Inc.
Rohm & Haas Co., Resinous Products Div.

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The Bagley & Sewall Company
Beloit Iron Works
Black Clawson Company
Dilts Machine Works
Downingtown Mfg. Co.
Frank W. Egan & Co.
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Holyoke Machine Co.
Lobdell United Co.
Edward J. McBride Co., Inc.
The Moore & White Co.
D. J. Murray Mfg. Co.
Perkins, B. F., & Sons Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
U. S. Rubber Co.
Valley Iron Works Co.
Waldron Corp., John
Wheeler Roll Co.

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**ROLL STANDS**
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Dilts Machine Works (Kohler Systems)
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Moore & White Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
John Waldron Corp.
H. G. Weber & Co., Inc.

**ROPE CARRIERS**
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The Moore & White Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works

**ROTARY KILNS**
F. L. Smidth & Co.

**ROTARY STEAM JOINTS**
Johnson Corp.
The Moore & White Co.
Rice Barton Corporation
Shartle Bros. Mch. Co.

**RUBBER PRODUCTS**
The Goodyear Tire & Rubber Company

**SATURANTS**
B. F. Goodrich Chemical Co.

**SATURATING MACHINES**
Dilts Machine Works
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Moore & White Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman G.

**SAVEALLS**
Bird Machine Company
Chicago Bridge & Iron Co.

**SAWS**
Simonds Saw & Steel Co.

**SCALES**
Fairbanks, Morse & Co.
Merrick Scale Mfg. Co.
Testing Machines, Inc.

**SCREEN PLATES**
Bird Machine Company
Pitchburg Screen Plate Co.
Magnus Metal Corp.
Mowry Paper Mill Supply Co.
Testing Machines, Inc.
Union Screen Plate Co.

**SCREENS**
Allis-Chalmers Mfg. Co.
Appleton Wire Works
Appleton Machine Company
The Bagley & Sewall Company
Bird Machine Company
Carthage Machine Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
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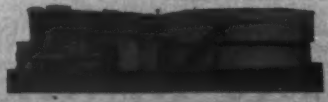

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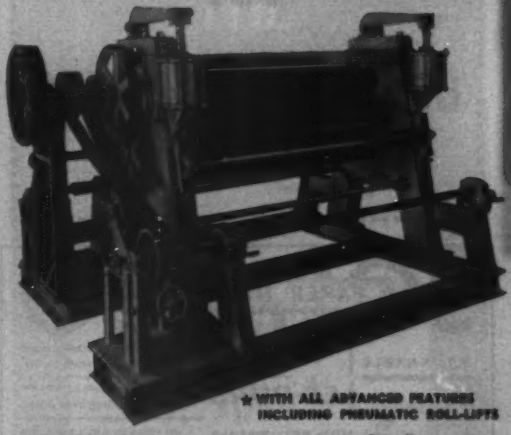

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Valley Iron Works Co.

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Valley Iron Works Co.
Williams Apparatus Co., Inc.

**SHEETERS**
Jagenberg-Werke Akt. Ges.

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Bird Machine Company
Downingtown Mfg. Co.
Moore & White Co.
Sandusky Fdy. & Mch. Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

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Carthage Machine Co.
Gibbs-Brower Company, Inc.
Jeffrey Mfg. Co.

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Rice Barton Corporation

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Glidden Company
Hercules Powder Co.
The Hubinger Co.
Monsanto Chemical Company
National Aluminate Corp.
Nopco Chemical Co.
Stein-Hall Co., Inc.
Wyandotte Chemicals Corp., Michigan Alkali Div.

**SIZING TESTER**
W. & L. E. Gurley
Testing Machines, Inc.
Thwing-Albert Instrument Co.
Williams Apparatus Co., Inc.

**SLIME CONTROL**
The Dow Chemical Company
E. I. du Pont de Nemours & Co.
General Dyestuff Corp.
Monsanto Chemical Co.
National Aluminate Corp.
Rohm & Haas Co.
Vanderbilt Co., R. T.
Wyandotte Chemicals Corp., Michigan Alkali Div.

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Dietz Machine Works
Dilts Machine Works
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Gibbs-Brower Company, Inc.
Graphic Arts International Corp.
Thomas W. Hall Co., Inc.
Hamblet Machine Co.
Hudson-Sharp Mch. Co.
Jagenberg-Werke Akt. Ges.
Langston Co., Samuel M.
Moore & White Co.
D. J. Murray Mfg. Co.
Potdevin Machine Co.
Rice Barton Corporation
J. J. Ross Company
Ross Paper Mach'y. Co.
The Sandy Hill Iron & Brass Works
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

**SMOKE STACKS**
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**SOFTNESS-STIFFNESS TESTER**
W. & L. E. Gurley
Testing Machines, Inc.
Thwing-Albert Instrument Co.

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Nopco Chemical Co.

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Dilts Machine Works
Egan, Frank W., & Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
John Waldron Corp.

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Bunge Pulp & Paper Co.
Williams-Gray Co.

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Michigan Steel Casting Co.
U. S. Steel Corp.

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Clinton Foods, Inc.
The Hubinger Co.
National Starch Products Inc.
Stein-Hall Co., Inc.

**STEAM JOINTS**
The Moore & White Co.
Rice Barton Corporation
Shartle Bros. Mch. Co.

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Babcock & Wilcox Co.
Combustion Engrg. Co., Inc.
Johnson Corp.
Stickle Steam Specialties Co.

**STEEL**
Armco Steel Corp.
Carnegie Illinois Steel Co.
Lukens Steel Company
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
U. S. Steel Corp.

**STEEL CLAD**
Babcock & Wilcox Co.
Lukens Steel Company

**STEEL TANKS**
Chicago Bridge & Iron Co.
The Sandy Hill Iron & Brass Works

**STRETCH TESTER**
Thwing-Albert Instrument Co.

**STUFF CHESTS**
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
Rice Barton Corporation
Shartle Brothers Machine Co.
Valley Iron Works Co.

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Downingtown Mfg. Co.
E. D. Jones & Son Co.
Moore & White Co.
Rice Barton Corporation
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

**SUCTION ROLLS**
Beloit Iron Works

**SULPHITE SPECIALTIES**
Canadian Newsprint Supply Co.

**SULPHUR**
Texas Gulf Sulphur Co.

**SULPHUR BURNERS**
Valley Iron Works Co.

**SULPHUR DIOXIDE**
American Cyanamid Company, Calco Chemical Div.
Ansul Chemical Co.
Virginia Smelting Co.

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The Appleton Machine Co.
B. F. Perkins & Son, Inc.

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B. F. Goodrich Chemical Co.
The Goodyear Tire & Rubber Company
Naugatuck Chemical Division of U. S. Rubber Co.
Nopco Chemical Co.

**TAKE OFF UNITS**
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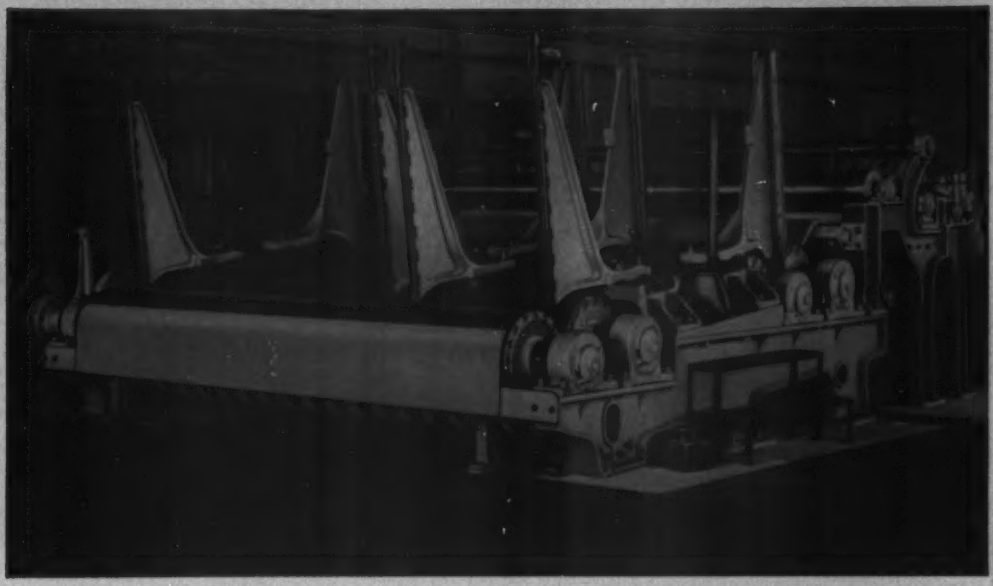

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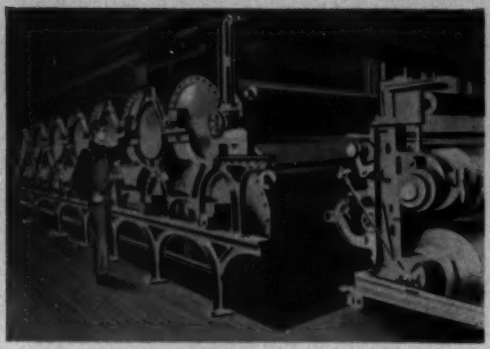

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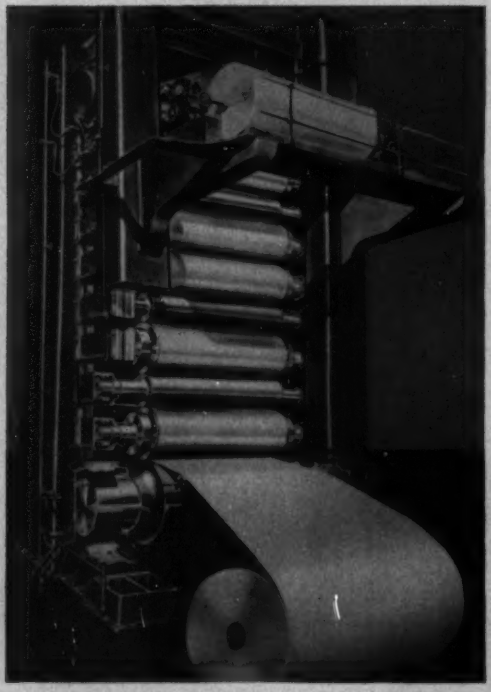

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